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**Measuring Leader Attributes in the Army
Reconnaissance Course**

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14. ABSTRACT (<i>Maximum 200 words</i>): Meeting the Soldier-centered intent of the Army Learning Model (ALM) has many challenges, including conducting assessments. Without effective assessment methodologies, instructors will not be able to provide students with tailored learning experiences. This research describes the development of a prototype, proof-of-concept measurement and assessment system for the Army Reconnaissance Course (ARC) to meet assessment challenges. The ARC, with a focus on the development of leader attributes, is one example of an Army course that has been revised to implement ALM principles. The ARC-Performance Assessment Toolkit (PAT) was developed to aid instructors in consistently and reliably assessing the 21 st Century Soldier Competencies and meets specific course requirements by providing a reliable mechanism for tracking student progress. The findings from an initial evaluation of the tool suggest that the ARC instructors found the ARC-PAT to be of help in addressing some of their assessment challenges. Although several modifications and enhancements are needed for the tool to be fully functional within the course, this research represents a step forward in meeting the intent of the ALM.					
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MEASURING LEADER ATTRIBUTES IN THE ARMY RECONNAISSANCE COURSE

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Measuring Leader Attributes in the Army Reconnaissance Course

Introduction

In 2011, the Army introduced the Army Learning Model (ALM) in the U.S. Army Learning Concept (ALC) for 2015 (U.S. Department of the Army, 2011) and put forth ideas for a more Soldier-centered approach to learning. At the center of the ALM is the concept of adaptability in that (a) the Army must develop adaptive Soldiers; (b) training content must be adaptive such that training occurs outside of the classroom and adjusts to operational needs; and (c) content, learning methods, and technologies continuously adapt based on Soldier performance. Among other changes, to enable those different forms of adaptation, the Soldier-centered environment requires a shift from instructor-based classroom methods of teaching to a blended, more individualized model that incorporates the three pillars of leader development: institutional instruction, self-development, and operational experience (U.S. Department of the Army, 2013). In such an environment, learning experiences are tailored to individual needs, creating more engaging and effective training. In addition, training must be focused on the development of 21st Century Soldier Competencies (U.S. Department of the Army, 2011), which are core competencies that provide the foundation for the development of operational adaptability. The ALC 2015 outlines nine 21st Century Soldier Competencies, including character and accountability; adaptability and initiative; and critical thinking and problem solving. The focus on such learning outcomes formalizes existing objectives in some institutional training courses and incorporates new goals in other courses which were previously focused primarily on tactical and technical competence.

Assessment is a specific challenge related to the execution of the ALM. “The importance of incorporating valid and reliable assessments in the 2015 learning model cannot be overstated” (U.S. Department of the Army, 2011, p. 21). Without appropriate, effective assessment methodologies, instructors will not possess the data necessary to provide the student with learning experiences that speak to his/her needs. The current work focused on the development of tools to help instructors assess the development of 21st Century Soldier Competencies effectively and reliably across students and instructors over time. Assessing the development of competencies such as adaptability and initiative is certainly not as straight forward as the assessment of a skill like marksmanship where there are well-defined performance standards. The tools described in this report provide observer-based methods for assessing specific 21st Century Soldier Competencies.

Current Research

One example of a course that has implemented ALM principles into its training is the Army Reconnaissance Course (ARC). The ARC aims to develop confident and agile Soldiers capable of operating under unpredictable combat and training situations. Specifically, along with technical and tactical reconnaissance skills, the ARC aims to develop Soldier competencies similar to those described in the ALM (c.f., U.S. Department of the Army, 2011; Table 1). The ARC instructors apply the principles put forth in the ALM to create learning experiences that allow students to develop these leader attributes.

Table 1

Leader Attributes Targeted in the ARC

Leader Attribute	Definition
Accountability	Takes responsibility for own and team's actions and consequences
Adaptability	Manages changing requirements for balancing unit recon, surveillance, and security with mission accomplishment
Anticipation	Foresees future requirements and conditions
Confidence	Believes in own and team's ability to handle tactical situations
Initiative	Thinks and acts without being urged
Problem Solving	Solves problems by applying deliberate thought
Risk Management	Assesses the situation against the mission and makes a decision – effectively balances mission requirements and risk

There are several issues that make assessment challenging within the ARC. First, as previously noted, it is difficult to accurately and consistently assess the development of leader attributes in students. Although the leader attributes are well-defined within the ARC curriculum, there is still a degree of subjectivity associated with the assessment of a competency such as confidence. Second, instructors who are observing and rating student performance rotate out during course exercises creating a need to communicate the levels at which students are performing. For example, when instructor A is replaced by instructor B during an exercise, instructor B needs to understand instructor A's observations and assessments of student performance during instructor A's shift. Finally, within the ARC, the main mechanism for tracking student progress is through paper-based assessments; a method is needed to increase the reliability and sustainability of those assessments and relieve some of the burden created through a paper-based approach. Tracking progress on the leader attributes and other relevant performance outcomes is important so that course events can be adjusted to continually challenge and develop the students based on prior performance.

To aid the ARC instructors with those assessment challenges, this research focused on the development of two products: (a) objective behaviorally-based measures of the leader attributes within the context of reconnaissance missions to promote consistency between and across students and instructors; and (b) a technology-supported performance assessment toolkit to allow instructors to more easily track critical performance information throughout the course. The remainder of this document describes the development and evaluation of these products.

Measure Development

Initial Measure Development

To aid the instructors in the assessment of leader attributes, we leveraged Aptima's COMpetency-based Measures for Performance ASsessment Systems (COMPASSSM) methodology, which is an approach to developing valid, reliable and sensitive measures of team and individual performance (see MacMillan, Entin, Morley, & Bennett, 2013). COMPASS employs an iterative series of three workshops with Army personnel as the subject matter experts (SMEs) to develop and initially validate performance measures. The purpose of the workshops is to obtain specific behavioral indicators in relation to performance objectives (in this case, the leader attributes). The COMPASS process is consistent with the development of Behavioral Anchored Rating Scales (BARS; Smith & Kendall, 1963), or perhaps even more similar, Behavioral Summary Scales (BSS; Borman, Hough, & Dunnette, 1976). Both BARS and BSS are "anchored with behavioral descriptions of effective and ineffective performance to guide raters' evaluations" (Pulakos, 1997, p. 300). BSS tend to be more generalizable than BARS because they provide multiple behavioral descriptors at different performance levels. Such rating scales, which focus on observable behaviors, are useful for understanding performance challenges (Beaubien, Goodwin, Milanovich, Baker, & Smith-Jentsch, 2004).

Senior ARC instructors served as SMEs for the COMPASS workshops. ARC instructors typically hold the rank of Staff Sergeants (SSGs), with approximately 10-12 years in service. Most instructors have been in leadership positions as scouts or senior scouts in reconnaissance units. ARC instructors are often graduates of the Advanced Leaders Course (ALC) and the Army Basic Instructor Course (ABIC). More senior instructors hold the rank of Sergeant First Class (SFC) and possess 12-15 years of experience. They may have held platoon sergeant positions and likely are graduates of the Senior Leaders Course (SLC) in addition to ABIC. Both SSGs and SFCs participated in the workshops.

During COMPASS Workshop 1, seven instructors provided information about the behaviors they look for to assess each leader attribute. To elicit that information, the instructors were asked to verbally describe what behaviors they look for in assessing each leader attribute within the context of three training events – Planning, Bridge Reconnaissance, and Patrolling. Next, performance levels or anchors of the observed behaviors were specified (i.e., excellent, average, and poor performance). The workshop resulted in a list of behavioral indicators for each attribute categorized from novice to expert and an ordering of the behaviors within each category based on the difficulty of the associated tasks. Following the workshop, behavioral indicators for each leader attribute for the three training events were synthesized by extracting common indicators within each attribute and across events. Those indicators were then developed into behavioral statements that would allow instructors to simply indicate whether or not they observed a student performing that specific behavior. For example, for the attribute of Confidence, instructors indicated that poor performance was characterized by students not knowing where to start solving a problem (e.g., not taking action) and continuously seeking instructor and peer approval. The information received about the indicators of Poor Confidence led to the development of six behavioral statements:

- Continuously seeks input from peers without deciding/acting
- Relies on only the "strong" students for support
- Changes answers when asked "why," chooses not to defend logic
- Loses momentum or takes too much time to decide
- Overly confident; manages all aspects of planning and execution without accounting for subordinate suggestions
- Subordinates overly question decisions

Similar statements were developed to describe Poor, Average, and Excellent performance on each of the attributes.

The goals of Workshop 2 were to ensure the completeness of the statements, reduce redundancy, and obtain input on the order of the behavioral statements to inform how they should be grouped. The workshop resulted in wording changes to some of the behavioral statements and deletions of redundant statements. The revised behavioral statements were used to develop the performance measures for each leader attribute. The scale on each measure was revised to fit the assessment scale currently used in the ARC (i.e., -2 to +2) as opposed to poor, average, and excellent performance.

The focus of Workshop 3 was to review the leader attribute measures for completeness and clarity. Over the course of about three hours, five instructors reviewed the measures and revised for clarity. As an example, the full Confidence measure is shown in Figure 1. The measures were then tested during an evaluation, which is described in the next section.

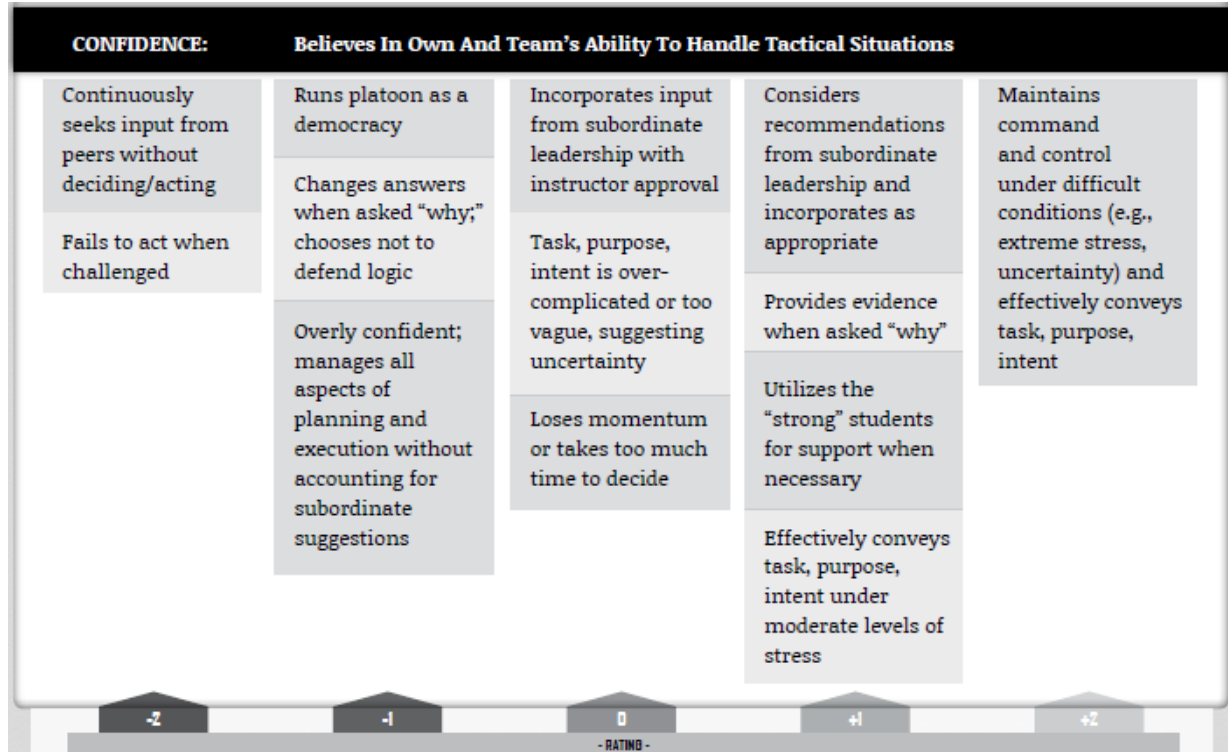


Figure 1. Example leader attribute measure.

Measure Evaluation

Measures were evaluated on their (a) usability and utility to the ARC instructors and (b) ability to reliably reflect leader attributes. Prior to using the measures during the ARC's culminating exercise, the instructors assigned to be involved in the evaluation participated in a planning meeting with the research team. The anchors were reviewed during this meeting to ensure that all raters were using the measures with the same frame of reference.

To evaluate the measures, approximately 12 hours of observations were conducted over the course of two days. During the observations, the research team's two SMEs (retired Army noncommissioned officers) were paired with an instructor to rate the students assigned to the Platoon Leader and Platoon Sergeant positions using the leader attribute measures; their ratings were later compared for level of agreement. Following the observations and evaluation period, the instructors completed a reaction questionnaire to assess the usability and utility of the measures (see Appendix A for the measure). Eight questions were asked (e.g., *I think that I would like to use these measures and anchors frequently*; *I thought that there was too much inconsistency in the anchors* [reverse coded]) to which the instructors responded on a 5-point scale (1 = Strongly Disagree; 5 = Strongly Agree). The evaluations occurred during key events during the training (planning, infiltration, and bridge reconnaissance). The instructors and the team's SMEs each made their ratings independently of one another, and as possible, the rating forms were collected directly following a key event. However, due to instructor schedules, several of the rating forms were not collected immediately.

Rater agreement results. To conduct the reliability assessment of the measures, rater agreement data were calculated by comparing paired ratings between the ARC instructors and the research team SMEs. For each of the seven attributes (Accountability, Adaptability, Anticipation, Confidence, Initiative, Problem Solving, and Risk Mitigation) between two and six pairs of ratings were available. The variability in the number of paired ratings for each attribute was due to missing data as well as the students not displaying some attributes during the training events. In total, 33 pairs of ratings were available to assess interrater agreement. Across all 33 pairs, percent agreement, as calculated by the paired ratings being within one point of each other, was 72.73%. However, when examined by attribute, percent agreement (again defined as the paired ratings being within one point of each other) ranged from 33% to 100%. Table 2 displays the agreement on each of the attributes, as well as the number of paired ratings available for each attribute. As can be seen, the two attributes with the lowest agreement are Adaptability and Confidence. In general, the percent agreement is good (with the exception of the Adaptability ratings) and demonstrates that the measures generally promote consistent assessment of the ARC leader attributes.

Table 2

Percent Agreement for Each Leader Attribute

Attribute	Number of Paired Ratings	Percent Agreement (within 1 point or better)
Initiative	4	100%
Risk Mitigation	2	100%
Accountability	6	83%
Anticipation	5	80%
Problem Solving	5	80%
Confidence	5	60%
Adaptability	6	33%

Following the evaluation, one final workshop was held with the instructors to revise the measures based on the evaluation data (e.g., reach 100% agreement for the scales with low levels of interrater agreement). In discussions between the research team's SMEs and the instructors who made the ratings, it became apparent that although many of the same student behaviors were noted by both individuals in each pair of observers close overlap in how each attribute is defined may have contributed to the low levels of agreement. For example, while the instructor and the research team's SME noticed the same behavior within students, the instructor used that behavior as an indication of Anticipation, while the research team SME coded that same behavior as an indication of Adaptability. In this case, the overlap is likely due to Anticipation being a key element of adaptive behavior, and because of that, anchors tended to reflect similar behaviors. This overlap across attributes speaks to the need for a tool to help instructors consistently rate students. In addition, the lack of agreement on some of the attributes indicates that for the measures to be maximally effective, the instructors should become more familiar with the behaviors listed for each attribute. It should be noted that prior to the evaluation, no practice ratings were completed. A best practice for implementing these measures in the course may be to include such training to ensure high reliability. Although slight revisions were made to two of the anchors (Adaptability and Confidence) following this final workshop, no major changes were made.

Usability and utility results. For the usability and utility evaluation of the measures, the average rating was 4.28 out of 5 ($SD = .64$), indicating that the anchors were perceived favorably. In addition, qualitative comments validated the quantitative ratings and substantiated the expectation that the rating form increases the consistency in how the instructors rated students. In particular, one instructor noted that he "found the anchors to be very effective at ensuring we, as instructors, rate attributes on the same guidelines." Item-level descriptive statistics are found in Appendix B.

Final Measures

The final measures are in Appendix C. As discussed, each of the seven leader attributes have behavioral descriptions that range from a -2 (to indicate that the student is engaging in behaviors that do not meet the intent of that leader attribute) to +2 (to describe the behaviors that

leaders should be seeing when a student is excelling at that attribute). A zero rating indicates that the student is performing at baseline per Army doctrine. The goal of the measures is to provide guidelines for instructors to orient them toward important behaviors. The measures may be especially useful for more novice instructors who do not have as much expertise in assessing the leader attributes as more experienced instructors. When student assessments are made based on the behaviors articulated in developed anchors, instructors should be rating students more consistently.

Tool Development

In addition to the performance measures, the ARC Performance Assessment Toolkit (ARC-PAT) was developed to support the ARC instructors and house the performance measures. The purpose of the toolkit is to provide mobile, digital data capture solutions with easy to use interfaces that reduce redundancies and overall workload. This goal was accomplished through the use of existing observer-based measurement tools (Aptima's SPOTLITE tool) and database software customized to the ARC's use case and assessment measures.

Requirements Elicitation Workshops

To develop a useful and usable tool that met the needs of the ARC instructors, requirements were gathered during a series of four workshops. Four to six instructors participated in each workshop, with several instructors participating in multiple workshops. The primary goal of the workshops was to develop a set of tools that would support the ARC instructors in their assessments and yield a reduction in overall workload.

The primary goal of the first workshop was to develop an understanding of the instructors' responsibilities in terms of assessment of students. The discussion centered on identifying what instructors must do on a day-to-day basis to document and report on student progression. This discussion yielded a set of requirements from which a series of static mockups were produced.

The second and third workshops focused on review and revision of the mockups generated after the first workshop. The second workshop featured an initial set of mockups representing the primary interface of the mobile field tool and key interface elements. These elements were presented and described to instructors. The mockups were presented in order of expected workflow to allow the instructors to conceptualize use of the tool to collect data and complete assessments for their students. During the presentation, instructors were encouraged to ask questions and provide comments with respect to the mockups and the tool concepts.

The third workshop's goal was to finalize interface and functional design ideas through a revised set of mockups. The revisions reflected feedback received during the second workshop. Again, the mockups were presented and described in a fashion consistent with the anticipated workflow, and participant instructors were encouraged to comment or question the approach. Revised mockups are in Appendix E.

The fourth workshop had two goals. The first was to demonstrate a working prototype of the ARC Field Tool (FT) and verify that its function and features aligned with expectations of the instructors. The second goal was to introduce mockups and storyboards of the Integrated

Database. Until this workshop, the database had only been discussed with respect to the requirements identified in the previous workshops. During this workshop, instructors were invited to try out the FT and provide comment. The database was presented in the same fashion as mockups for the FT in prior workshops, and instructors were encouraged to question, comment and otherwise guide revisions or changes to the tool and database.

Tool Functionality Development

After all requirements had been derived and the instructors were pleased with the mock-ups, development of the tool commenced. Tool development followed an iterative process broken up into three-week sprints. Each sprint contributed to the evolution of the software and progression towards a final working prototype. The first sprint focused on development of base graphical user interface (GUI) architecture and primary user controls. The second and third sprints added additional controls and features and brought the tool to test-ready state. The fourth sprint followed initial user demonstrations where feedback was elicited and refinements and revisions to the tool were implemented.

Key tool components. The ARC-PAT is an integrated mobile data collection and performance assessment system. The system is designed for ARC instructors to capture and rate student performance as they progress through the 27-day course. Data can be collected on student behaviors reflecting the expected course outcomes and the leader attributes (as described above and in Appendix B) in both classroom and field events. The ARC-FT is a digitized version of the notebook carried by instructors and the paper assessment form required for documentation of student progression. The ARC-FT enables ARC instructors to capture critical performance metrics for students that reflect learning and progression within the ARC. It also supports multi-media capture of student behavior including photo, video and voice-text and allows users to attach those data to assessments of the course outcomes and leader attributes. A simple trending interface within the app provides users with data on students over the duration of the course. The ARC-FT app is integrated with the ARC Database through a WiFi connection.

The Integrated Database is a web-based software tool that stores and manages student performance data. It features a user interface that supports the display and review of performance data across students, units, classes, and even years. The database interface offers tools for reviewing the data to identify trends and patterns that will help instructors and leadership manage the course. It also formats student performance data to mirror the assessment forms used by the instructors, which can be printed and stored according to current best practices. It is hosted on a desktop and offers a wireless local area network (LAN). The LAN allows configurations (e.g., student rosters) to be loaded onto the field tool and performance assessment data to be uploaded, stored, and printed. A diagram of the ARC-PAT architecture is shown in Figure 2.



Figure 2. Architecture diagram of ARC-PAT.

Tool Evaluation

The team conducted two evaluations of the tool. The first was a supported field test and the second was an unsupported leave-behind. Both evaluation opportunities occurred during regularly scheduled course assessment events. The primary goal of both evaluations was to informally evaluate, with SME and perspective user input, the ability of the ARC-PAT to support data collection and measurement during trainee assessment. In order for an assessment system to be efficient and effective, an instructor/unit leader must be able to use the system in an intuitive and easy manner while observing the Soldier behaviors. For research purposes, usability was defined as a *measure of the effectiveness, efficiency, and satisfaction with which specified users can achieve goals in a particular environment*. The term effectiveness refers to the utility of ARC-PAT in collecting, summarizing, measuring, and reviewing behaviors during training. Efficiency and satisfaction were operationalized as the users' ability to perform these tasks quickly and relatively error free. A secondary goal of the evaluation was to identify opportunities for enhancement of the tools based on usability issues or shortfalls in the toolkit's functionality.

Seven ARC instructors participated in the first field test, and five participated in the unsupported leave-behind, with some overlap in instructors across the two events. During both events, instructors used the tools to evaluate student performance during graded course events. Prior to the start of the evaluations, instructors were given access to the tool, and training occurred on both the functionality of the tool and the measures. During the training, a written user guide (see Appendix F) was provided that pointed out the intended use of the toolkit and identified the main operations and features that facilitate its use. Following the training, the research team encouraged the instructors to familiarize themselves with the functions of the tool prior to using the tool during the field training exercises (FTXs) and other graded course events.

The first evaluation was a brief, fully supported test of the ARC-FT during one of the ARC's FTXs. This fully supported test consisted of the research team being embedded with the ARC instructors. Although researchers provided technical and user support during the event, support was restricted to answering instructor questions and providing assistance as requested,

rather than demonstrating the tool's potential capabilities. This strategy allowed the instructors to identify problem areas that needed to be addressed.

The second evaluation consisted of a minimally supported leave-behind with the complete ARC-PAT available for instructor use. ARC-PAT was left with the instructors for one full class cycle, or about 40 days. During this time, no researchers were present; however, routine check-ins were performed to ensure that the software was operating as intended and to answer instructors' questions. Instructors could use the system as much or as little as they desired with no encouragement or additional instruction offered by the research team. The goal of this evaluation was to identify any other outstanding problems that needed to be addressed prior to the end of the research project. Additionally, the realistic conditions of the leave-behind permitted a more rigorous test of the tool's capabilities, functions, and interactivity with the instructors.

Shortly after both evaluations, instructors were asked to complete several assessment instruments: a usability questionnaire, a set of usability and utility statements, and a five-item structured interview aimed at identifying the extent to which the tools sufficiently met a set of key design principles, and thus achieved the goals of effectiveness, efficiency, and satisfaction.

The usability questionnaire is a standard set of 10 general statements about the tool to which respondents can agree or disagree on a 4-point scale (Strongly Disagree, Disagree, Agree, Strongly Agree). The results of this questionnaire point to the general approval or disapproval of the tool but do not point to any specific elements of the tool that may be desirable or undesirable. More specific queries are featured in the usability statements. Separate usability questionnaires were developed for the ARC-FT and Integrated Database. Both questionnaires (Appendix G) are adapted from the scale described earlier to gather data on the usability and utility of the leader attribute measures (Appendix A). Note that the leader attributes were assessed on a five-point scale; for this evaluation, the mid-point was removed to promote more definitive answers, resulting in a four-point scale.

The usability and utility statements were based on heuristics derived from research by Nielsen and Mack (1994) and Tognazzini (2003) that represent tool usability. Collectively, these heuristics or design principles were applied to develop a set of 26 (ARC-FT) and 22 (Integrated Database) items. These items were structured as statements that were framed positively or negatively for the ARC-FT and Database, respectively. Participants were provided a document with the items and asked to check agree or disagree with each of the statements. The two sets of usability statements are featured in Appendix H. These statements allow for a more fine-grained assessment of the toolkit by asking questions about specific features, as opposed to the more general assessment provided by the standard usability questionnaire.

The interview provided an opportunity for instructors to report usability issues that may not have been captured in the surveys. In particular, the interview elicited specific feedback from the instructors' experiences in using the tool and asked the user to elaborate on their responses on the questionnaires. The interview data were added context to the questionnaire results and identified enhancements to the tools. One interview protocol was generated to address the entire toolkit (see Appendix I).

Tool evaluation results. Responses to the usability questionnaire were positive on all accounts. For the supported evaluation, the mean rating across 10 questions was 3.65 ($SD = .56$) on a scale of 4. For the unsupported evaluation, the mean rating for the FT was 3.36 ($SD = .63$). Finally, for the unsupported evaluation for the Integrated Database, the mean rating was 2.92 ($SD = .97$). Detailed item-level descriptive statistics for each portion of the evaluation are in Appendix J. For the unsupported evaluation, the items with the lowest ratings were those that asked about the complexity of the system. Based on the ratings from the usability scale, it appears that the largest challenge with the FT was in learning the system and becoming familiar with the features and functionalities. As instructors use the FT more often, it is anticipated that those ratings would increase, and instructors will feel more comfortable with it. As demonstrated by the means, the instructors reported lower ratings for the database compared with the FT. As expanded upon below, the instructors did not use the database as much as the FT, and thus, the lower ratings are not completely unexpected.

Responses to the usability and utility statements (Appendix H) were largely positive. Users were provided with two options for responding to usability statements (Agree, Disagree). Percent agreement was calculated and reported with respect to Agree. The percent agreement per item for both the supported and unsupported evaluations is contained in Appendix J. Because one intent of using this measure was to identify specific features and functionalities that needed to be changed, the research team set a strict “passing” criteria – 80% for the supported field test, and 75% for the unsupported leave-behind for the FT; anything less than those standards represented a feature that may be in need of revision. The 75-80% criteria were set so as to ensure a strict level of scrutiny, leading to the identification of better interactions and interface elements in the final development iteration.

For the supported field test, 20 out of 26 items reflected the passing criteria of over 80% agreement. For the unsupported evaluation, 25 out of 26 items had agreement levels of 75% or above for the FT. In both cases, the failing items pointed to some revisions that should be made to the tool. For example, the instructors had a difficult time knowing if they had completed an observation, indicating that changes to the interface are potentially necessary. In both the supported and unsupported evaluations for the FT, users were not always aware of errors made or how to correct those errors.

Users did not embrace the Integrated Database as enthusiastically as the FT, with only 12 out of 22 items receiving “passing” responses. Two caveats exist in regard to these data. First, the FT was more frequently used by instructors than the database. While the FT was carried by the instructors throughout the course, the database was used only after the data were collected on the FT by each rater. Thus, the database was possibly only accessed once during the class. Further, the instructors appeared to elect an unofficial Database Administrator during the leave-behind which significantly reduced the number of users. This point leads to the second caveat, which is that, given the low response rate, further testing of the database is needed to better understand its strengths and weaknesses.

Last, instructors briefly interviewed about the tool. The instructors offered a number of suggested enhancements (Table 3). The interview data mostly represent suggested enhancements that are at a higher level than the more specific data from the usability

questionnaires (i.e., these suggestions represent additional features versus more standard usability issues).

Table 3

Qualitative Feedback for ARC-PAT

Link with Army network and shared drives.
Include roll-up data of student's performance by phase
Add PDF viewer for publications
<i>Discard and Close</i> should be deleted or changed – deletes an assessment
Include a map and way point tracker
More in-depth training on the database
Include a signature pad for the students for green/red cards
Implement ability to drop a picture in an assessment
Green/red card stand-alone functions (print independently from assessment)
Develop a Print function within the field tool
Interface between app and photo gallery for assessments

Summary

The research presented here describes the development of a prototype, proof-of-concept measurement and assessment system. The ARC-PAT was developed to aid instructors in consistently and reliably assessing leader attributes and to provide a mechanism for tracking student progress between and within instructors. The specific tool requirements were obtained from experienced ARC instructors, and the system was developed to meet their assessment needs. More generally, however, the ARC-PAT addresses the requirements put forth by the ALM to accurately and reliably assess 21st Century Soldier Competencies. Without accurate and reliable assessments, training cannot successfully be tailored to the individual student.

The findings from the initial evaluations are favorable and indicate that the ARC instructors found the ARC-PAT to be of help in addressing some of their assessment challenges. Although several modifications and enhancements are needed for the tool to be fully functional within the course, this research represents a step forward in meeting the intent of the ALM.

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APPENDIX A

Standard Usability and Utility Questionnaire for the Leader Attribute Measures

Directions: Place a check mark in the box that best represents your rating of your experience.

	Strongly Disagree						Strongly Agree
1. I think that I would like to use these measures and anchors frequently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		
2. I found the anchors to be unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		
3. I thought the anchors were easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		
4. I thought there was too much inconsistency in anchors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		
5. I would imagine that most people would learn to use these measures and anchors very quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		
6. I found the anchors to be very cumbersome to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		
7. I felt confident using the anchors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		
8. I needed to learn a lot of things before I could get going with anchors and measures.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	1	2	3	4	5		

APPENDIX B

Item-Level Descriptive Statistics for the Usability and Utility Results of the Leader Attribute Measures

Statement	N	Mean	Median	Mode
1. I think that I would like to use these measures and anchors frequently.	5	3.80	4	3
2. I found the anchors to be unnecessarily complex.*	5	1.60	2	2
3. I thought the anchors were easy to use.	5	4.00	4	4
4. I thought there was too much inconsistency in the anchors.*	5	1.40	1	1
5. I would imagine that most people would learn to use these measures and anchors very quickly.	5	4.40	4	4
6. I found the anchors to be very cumbersome to use.*	5	1.80	2	2
7. I felt confident using the anchors.	5	4.40	4	4
8. I needed to learn a lot of things before I could get going with the anchors and measures.*	5	1.60	1	1

* These items were reverse coded for interpretation.

APPENDIX C

Final Leader Attribute Measures

STUDENT:	CAV:
INSTRUCTOR:	DATE:

ACCOUNTABILITY:	Takes Responsibility For Own And Team's Actions And Consequences			
<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Delegates responsibility without oversight</div> <div style="border: 1px solid black; padding: 5px;">Mismanages timeline and misses mission objectives</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Delegates tasks without follow-up</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Does not pass critical information in a timely manner</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Task focused vs. mission focused</div> <div style="border: 1px solid black; padding: 5px;">Fails to take ownership of mistakes/ miscalculations</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Appropriately delegates task/ authority but with limited or untimely follow-up</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Communication without recommendation</div> <div style="border: 1px solid black; padding: 5px;">Manages time to meet minimal mission success criteria (e.g., little/no time for rehearsals)</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Communicates information and makes recommendations in a relevant and timely manner</div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Mission focused vs. task focused (e.g., accounts for follow on and adjacent units; commander's decision making cycle)</div> <div style="border: 1px solid black; padding: 5px;">Expresses intent and takes ownership of mistakes/ miscalculations</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Retains responsibility and verifies that delegated tasking meets mission objectives by engaging in a timely follow-up</div> <div style="border: 1px solid black; padding: 5px;">Makes decisions that demonstrate understanding of mission one level up and two levels down</div>

-2

-1

0

+1

+2

- RATING -

COMMENTS/NOTES: _____

ADAPTABILITY:	Manages Changing Requirements For Balancing Unit Recon, Surveillance, And Security With Mission Accomplishment			
<div style="border: 1px solid black; padding: 5px;">Inaction; paralyzed</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Rigidly follows plan in changing tactical conditions (e.g., "fights the plan, not the battle")</div> <div style="border: 1px solid black; padding: 5px;">Articulates the problem but does not work toward a solution</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Focuses on getting "right" answer</div> <div style="border: 1px solid black; padding: 5px;">Articulates the problem, takes action, but changes are not fully effective</div>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Responds effectively, but slowly (may need to be prompted to stay on schedule)</div> <div style="border: 1px solid black; padding: 5px;">Adapts principles/ doctrine to attempt to solve a new problem.</div>	<div style="border: 1px solid black; padding: 5px;">Changes behavior in a timely manner in response to tactical conditions to effectively meet purpose, task, and end state</div>

-2

-1

0

+1

+2

- RATING -

COMMENTS/NOTES: _____

ANTICIPATION: Foresees Future Requirements And Conditions				
Constantly surprised by unexpected consequences	Sometimes does not anticipate unexpected events; assumes METT-TC will remain constant	Links tasks to overall mission with guidance	Anticipates problems for own and follow on units; develops multiple contingency plans	Stays one step ahead of commander's needs, and identifies second and third order effects
	Reactive; waits for instructor directions/prompts	Focuses on local problem (task vs. mission focused)		Exploits opportunities as they emerge

-2
-1
0
+1
+2

- RATING -

COMMENTS/NOTES:

CONFIDENCE: Believes In Own And Team's Ability To Handle Tactical Situations				
Continuously seeks input from peers without deciding/acting	Runs platoon as a democracy	Incorporates input from subordinate leadership with instructor approval	Considers recommendations from subordinate leadership and incorporates as appropriate	Maintains command and control under difficult conditions (e.g., extreme stress, uncertainty) and effectively conveys task, purpose, intent
	Changes answers when asked "why;" chooses not to defend logic	Task, purpose, intent is over-complicated or too vague, suggesting uncertainty	Provides evidence when asked "why"	
Fails to act when challenged	Overly confident; manages all aspects of planning and execution without accounting for subordinate suggestions	Loses momentum or takes too much time to decide	Utilizes the "strong" students for support when necessary	
			Effectively conveys task, purpose, intent under moderate levels of stress	

-2
-1
0
+1
+2

- RATING -

COMMENTS/NOTES:

INITIATIVE: Thinks And Acts Without Being Urged				
Does nothing, even after prompting from the instructor	Needs to be told by leader or instructor to execute task	Seeks approval for ideas prior to acting on decision	Typically acts independently without instructor support	Identifies and solves problems by maximizing use of enablers and assets
	Fills white space/ down time but not effectively	Takes action without fully accounting for terrain, threat, own forces supported	Effectively uses white space to facilitate mission	Continuously improves/adjusts to the situation
	Does not capitalize on known opportunities to exploit situations	Takes action but is unable to fully address problem without leader or instructor support (e.g., instructor provides hint toward solution)	Identifies and incorporates multiple contingency plans	Proactively exploits opportunities to gain additional information or advantage (e.g., switches from reconnaissance to surveillance to security)
<div> <div>-2</div> <div>-1</div> <div>0</div> <div>+1</div> <div>+2</div> </div> <div>- RATING -</div>				
COMMENTS/NOTES:				

PROBLEM SOLVING: Solves Problems By Applying Deliberate Thought				
Does not recognize when problems arise	Identifies and reacts to immediate/local problems; provides a short-term solution	Recognizes problem and identifies one solution within sphere of influence (e.g., uses only organic assets to solve problems)	Employs organic assets and plans for the use of some additional available assets	Effectively employs full range of available assets and capabilities and incorporates all relevant considerations (enemy, terrain, infrastructure, society) in developing COA
	Gives up/does not continue to troubleshoot when faced with obstacles	Focuses on getting the right answer but not on the process	Applies unique solutions to novel problems but solution may not be fully effective	Consistently recognizes and frames problems and works toward a range of solutions across multiple problems with no instructor support
<div> <div>-2</div> <div>-1</div> <div>0</div> <div>+1</div> <div>+2</div> </div> <div>- RATING -</div>				
COMMENTS/NOTES:				

RISK MANAGEMENT:**Assesses The Situation Against The Mission And Makes A Decision -- Effectively
Balances Mission Requirements And Risk**

Rushes to solution without taking proper precautions or developing contingency plans (rushes to failure)

Assumes too much risk, or over-mitigates and fails to act

Does not use available capabilities to ensure success and minimize risk

Reactively manages risk without analysis

Conducts limited analysis to satisfy doctrine or tactical tasks without understanding of larger mission, intent

Integrates risk mitigation in the planning process but does not fully execute or make in-stride adjustments

Uses available capabilities to mitigate risk but with instructor assistance

Plans viable contingency plans, and executes them as needed

Continuously plans and communicates risk mitigation to the appropriate organizational level (i.e., lower, higher, both)

Uses all available capabilities to mitigate risk

Conducts cost-benefit analysis, recognizes and exploits opportunities/enemy weaknesses, and develops tactically sound recommendation for all levels

-2

-1

0

+1

+2

- RATING -

COMMENTS/NOTES:

APPENDIX D

Revised Tool Mock-Ups

Blackjack

New Observation

Camera

Voice to Text

Notes

16

Calendar

Blackjack

Thursday, January 16, 2014

Movement to point Bravo
Recce target Kilo

RELATED EVENTS: [FM 4-101](#); [FM 4-210](#)

Select a student

Select Cav

Select event and choose to assess or measure

☐ Movement to point Bravo

☐ Recce target Kilo

Assess

[Completed Assessments](#)

10:20

Blackjack

New Observation

Camera

Voice to Text

Notes

16

Calendar

Blackjack

Thursday, January 16, 2014

Movement to point Bravo
Recce target Kilo

RELATED EVENTS: [FM 4-101](#); [FM 4-210](#)

Select a student

CAV 2

Veatiers, E	2LT	Platoon Leader
Smith, F	SSG	Gunner
Johnson, K	2LT	Dismount
Jones, S	SGT	Dismount Team Leader
Williams, D	2LT	Alpha Team Leader
Miller, C	2LT	Dismount

Select event and choose to assess or measure

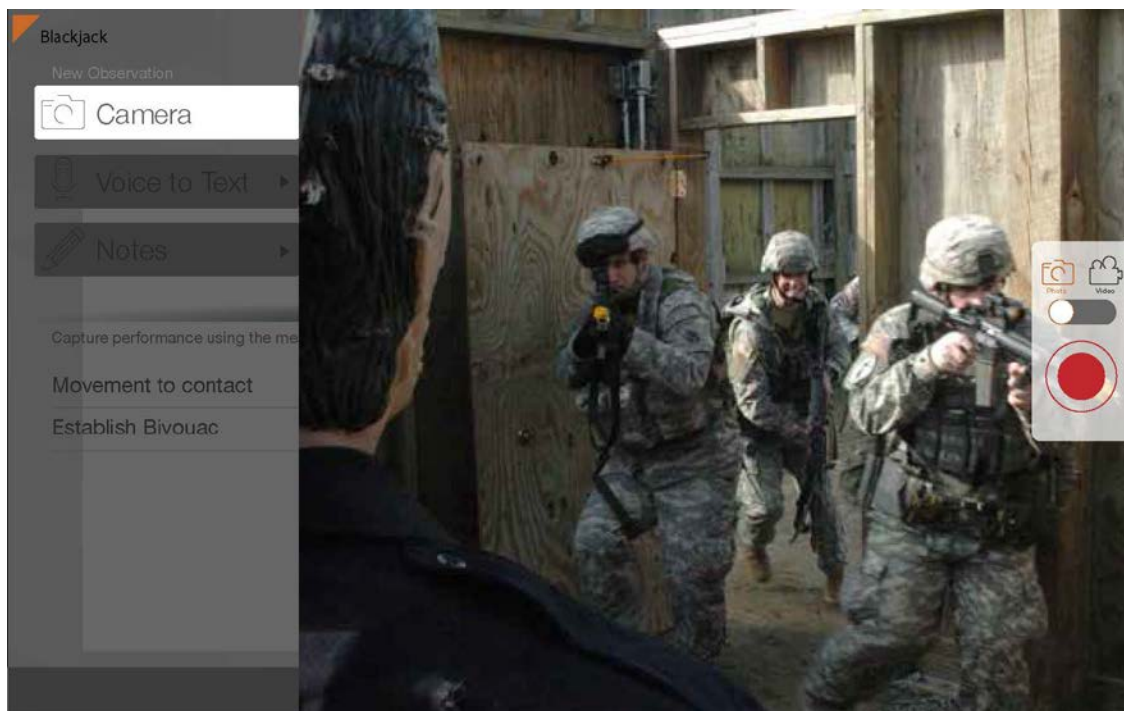
☒ Movement to point Bravo

☐ Recce target Kilo

Assess

[Completed Assessments](#)

10:20



Blackjack

New Observation

Camera

Voice to Text

Notes

Capture performance using the me

Movement to contact

Establish Bivouac

Observation Details

Date

Thursday, January 16, 2014

Observation Title

Blackjack

Summary

LEADER ATTRIBUTE

Accountability

Adaptability

OUTCOME

Demonstrate ability to think, persevere under physical and mental pressure.

CAV

CAV 2

☒
Rated

Vestiers, E.

2LT

Platoon Leader

☒
Rated

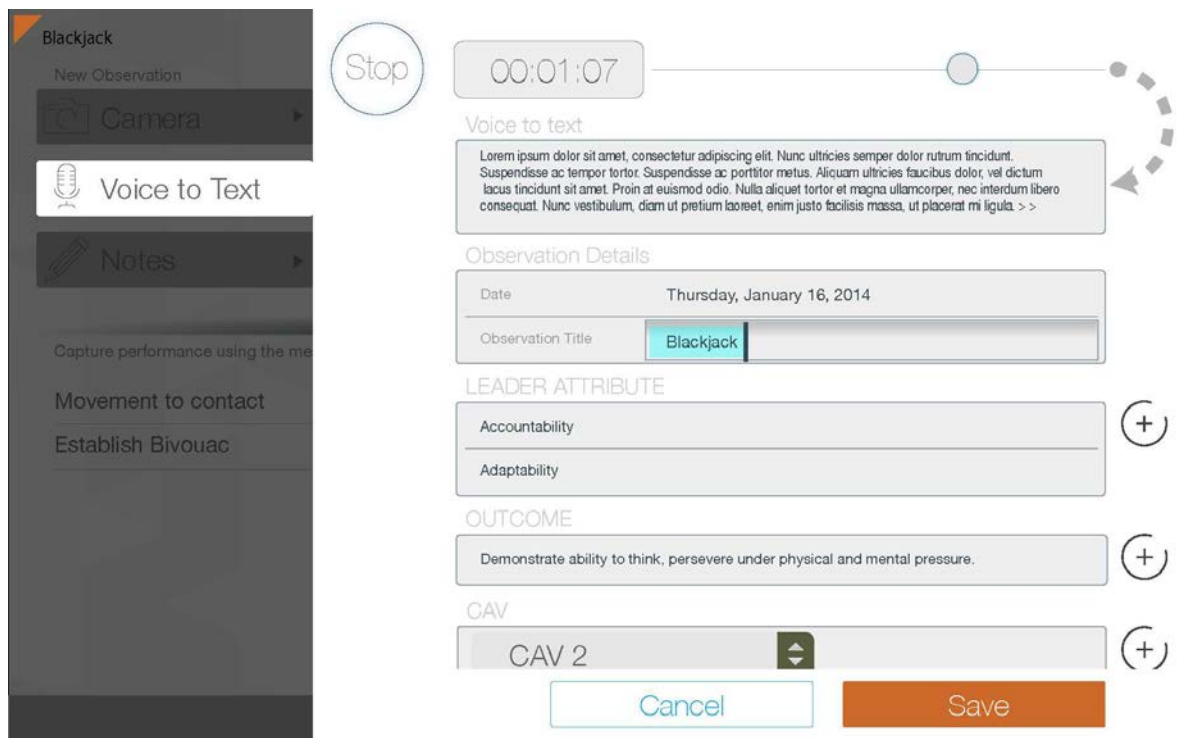
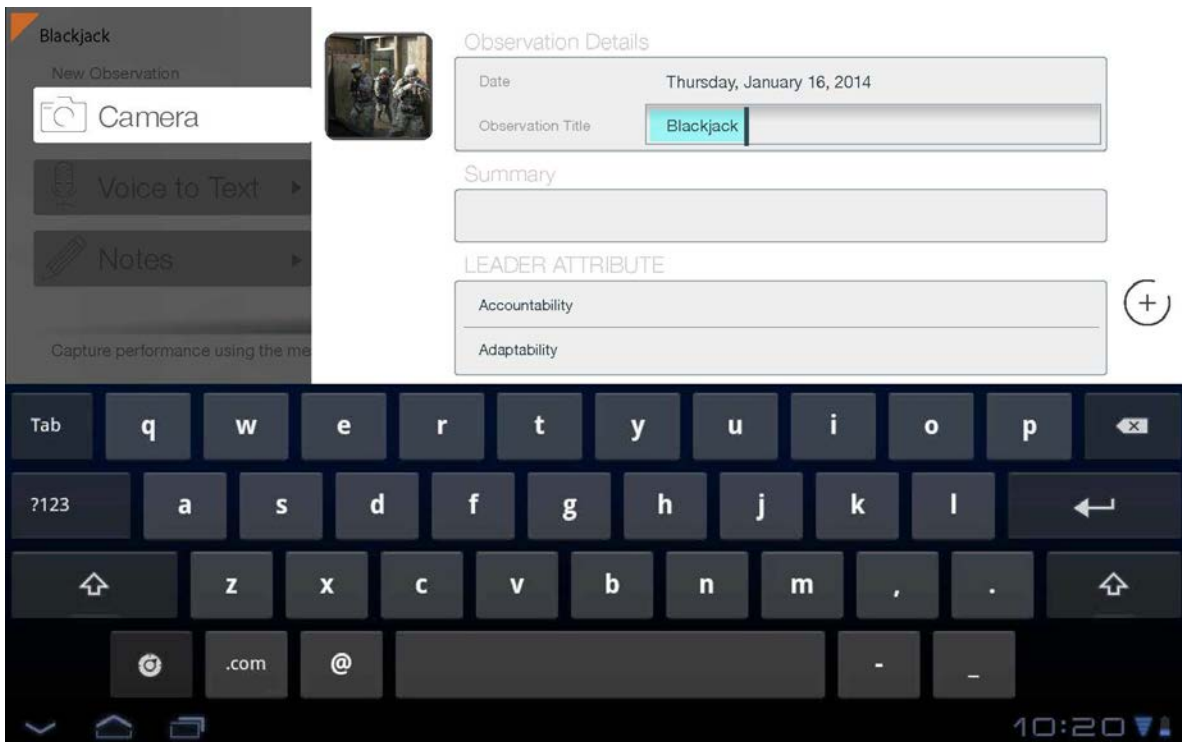
Smith, F.



SSG


Gunner



Cancel

Save





Blackjack > Assess Save  

 **Thursday, January 15, 2014**

Movement to contact  Student **Vestiers, E.** 2LT 
Platoon Leader

Outcomes **Attributes** Recommendations


 +
Attach






Observably Higher Fundamental Skills  NA



- Exceed Army standards for land navigation tasks and skills.
- Exceed Army standards for reporting and communicating tasks.
- Demonstrate improved ability to assess terrain, enemy capabilities, friendly capabilities.
- Demonstrate ability to think, persevere under physical and mental pressure.


Summary:



+2 +1 0 -1 -2




   10:20  


Blackjack > Assess Save  

 **Thursday, January 15, 2014**

Movement to contact  Student **Vestiers, E.** 2LT 
Platoon Leader


Outcomes **Attributes** Recommendations






 +
Attach

Accountability Takes responsibility for own and team's actions and consequences PI  NA

Summary:

+2 +1 0 -1 -2



   10:20  

Blackjack > Assess

Thursday, January 15, 2014

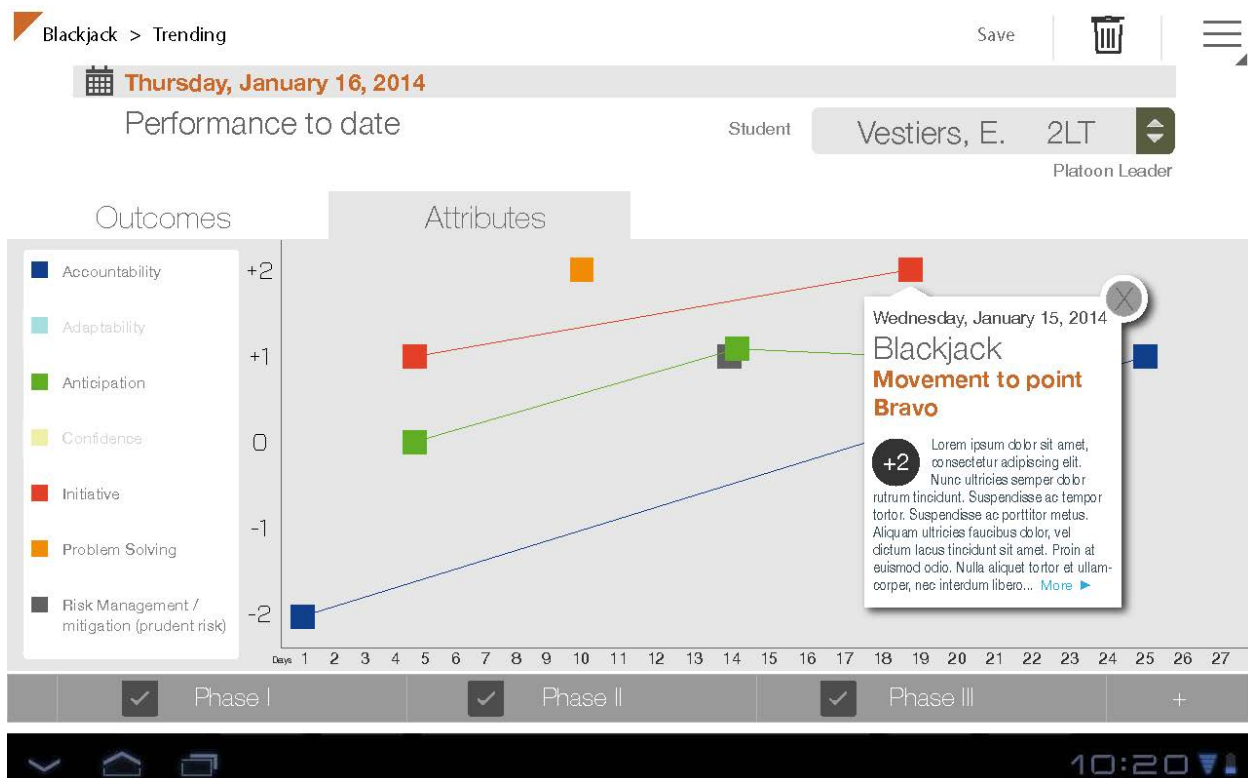
Movement to contact

Student Vestiers, E. 2LT

Performance Indicator | Accountability

<input type="checkbox"/> 1. Delegates tasks without follow up	<input type="checkbox"/> 1. Delegates some tasks appropriately	<input type="checkbox"/> 1. Delegates and prioritizes tasks appropriately
<input type="checkbox"/> 2. Delegates responsibility	<input type="checkbox"/> 2. Limited or untimely follow-up	<input checked="" type="checkbox"/> 2. Retains responsibility
<input type="checkbox"/> 3. Does not pass critical information in a timely manner	<input type="checkbox"/> 3. Manages time to meet minimal mission success criteria (e.g., little/no time for rehearsals)	<input type="checkbox"/> 3. Mission focused v. task focused (e.g., accounts for follow on & adjacent units; commander's decision-making cycle)
<input type="checkbox"/> 4. Task focused vs. mission focused	<input type="checkbox"/> 4. Communication without recommendation	<input checked="" type="checkbox"/> 4. Communicates relevant and timely information
<input type="checkbox"/> 5. Miscalculates personnel capabilities in satisfying mission requirements (e.g., personnel are smoked when they get to objective and can't fight)		<input checked="" type="checkbox"/> 6. Manages time effectively across the mission to meet objectives
<input type="checkbox"/> 6. Mismanages timeline and misses mission objectives		

Cancel Done





Thursday, January 16, 2014

Performance to date

Student

Vestiers, E.

2LT

Platoon Leader

Outcomes

Attributes

- Accountability
- Adaptability
- Anticipation
- Confidence
- Initiative
- Problem Solving
- Risk Management / mitigation (prudent risk)

+2
+1
0
-1
-2

Days 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

Phase I



Phase II

Phase III

+

Wednesday, January 15, 2014

Blackjack

Movement to point Bravo

+2

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nunc ultricies semper dolor rutrum tincidunt. Suspendisse ac tempor tortor. Suspendisse ac porttitor metus. Aliquam ultricies faucibus dolor, vel dictum lacus tincidunt sit amet. Proin at euismod odio. Nulla aliquet tortor et ullamcorper, nec interdum libero... [More](#)



10:20

APPENDIX E

Tool User Guide

Army Reconnaissance Course Performance Assessment Toolkit (ARC-PAT) User Guide



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Introduction

This manual provides basic user guidance for the ARC-Performance Assessment Toolkit. Details about the purpose of the tool kit and the individual tools are included. Should this text be insufficient to resolve technical or user problems, support information is provided below.

Support

Courtney Dean
781-496-2455
cdean@aptima.com

Overview

The Army Reconnaissance Course-Performance Assessment Toolkit (ARC-PAT) is an integrated mobile data collection and performance assessment system. The system is designed for ARC cadre to capture and rate student performance as they progress through the 27-day course. Data can be collected on student behaviors reflecting Expected Outcomes and Leader Attributes in both the classroom and field events. ARC-FT (ARC Field Tool) is a digitized version of the notebook carried by cadre and the paper assessment form required for documentation of student progression. The ARC-FT is integrated with the ARC Integrated Database.

The Integrated Database is a web-based software that stores and manages student performance data. It features a user interface that supports the display and review of performance data across students, units, classes and even years. The database interface offers tools for reviewing the data to identify trends and patterns that will help instructors and leadership manage the course. It also formats student performance data into a format that mirrors the assessment forms used by cadre, which can be printed and stored according to current best practices. It is hosted on a desktop and offers a wireless local area network (LAN). The LAN allows configurations (e.g., student rosters) to be loaded onto the field tool and performance assessment data to be uploaded, stored, and printed. ARC-FT enables ARC instructors to capture critical performance metrics for students that reflect learning and progression within the ARC. It supports multi-media capture of student behavior including photo, video and voice-text and allows users to attach these data to Leader Attributes and Expected Outcomes, reducing repeated efforts. These captured behaviors can later be attached to the assessments of those same outcomes and attributes.

This manual describes how to install and use ARC-FT and the ARC Integrated Database.

ARC-FT

Installation and Setup

This section details the steps necessary to install ARC-FT. These instructions are based on the assumption that the user has administrative privileges on the device on which the software will be installed. The software has been designed to run on a mobile device running the Android Operating System.

Operating System Requirements

ARC-FT has been tested on Android operating systems (4.1 and up). Installation on other operating systems is currently not supported and is done at the user's own risk.

Software and Hardware Requirements

- 8+ inch Android Tablet
- 1GHz processor minimum
- 400MB RAM
- 2 GB storage space minimum (4GB recommended)
- ARC-FT requires Android 4.1 or higher.
- ARC-FT requires 10 MB of internal storage.

Installation

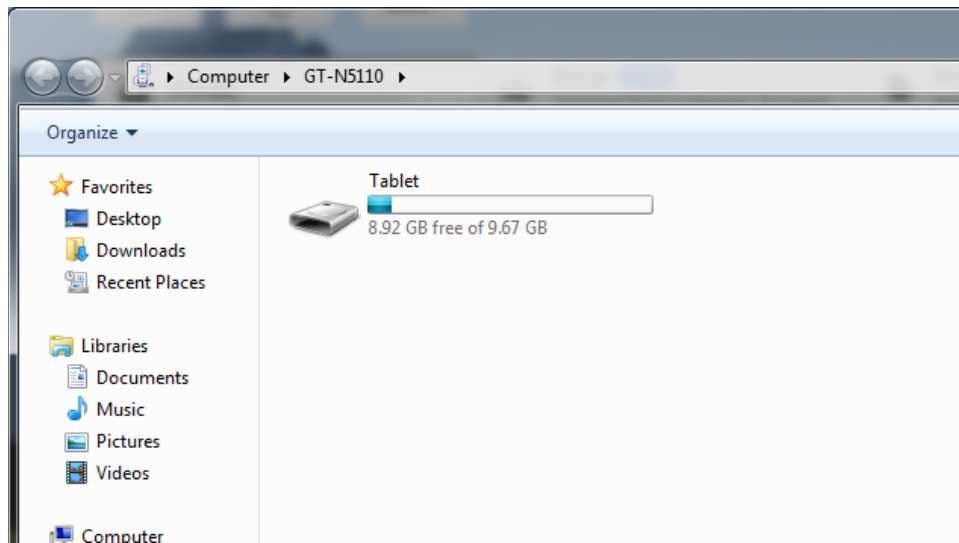
This section covers the steps necessary to install ARC-FT on an Android device. These instructions are based on the assumption that the user has access to an Android v4.1 or higher tablet or smartphone and a connecting USB cable. The steps covered in this section are consistent for all versions of ARC-FT.

Step 1. Begin Installation

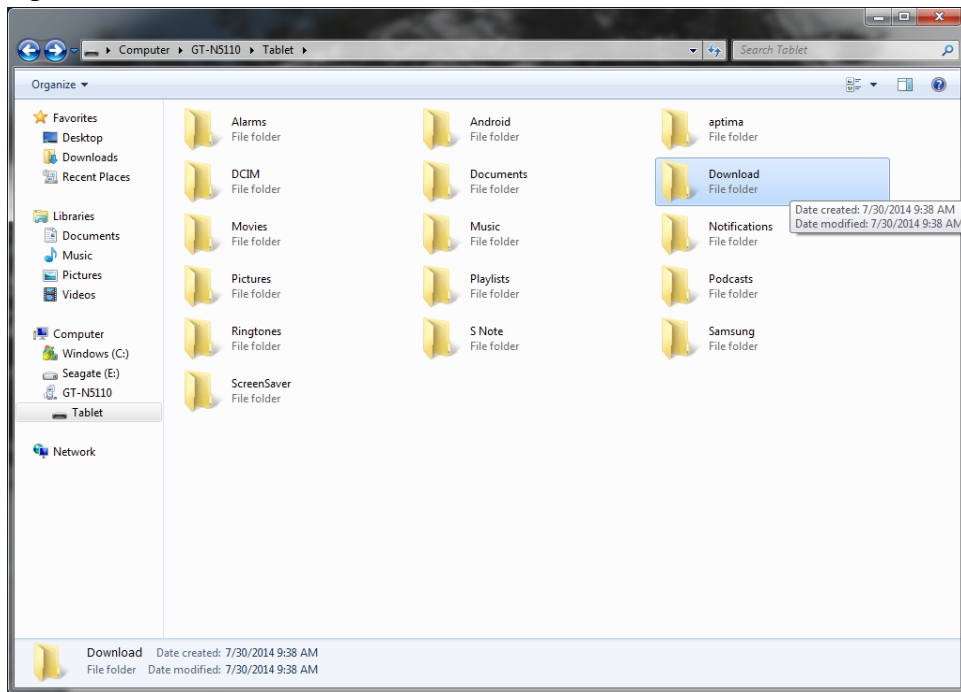
1. Access arcft.apk on your PC
 - a. This may have been received via email, DVD/CD ROM, or FTP
 - b. Save the .apk file to your desktop (or a designated folder on the PC)
2. Connect tablet to computer via USB cable
3. When Windows prompts user to act on the device, select "Open device to view files"



4. Double-click on Tablet

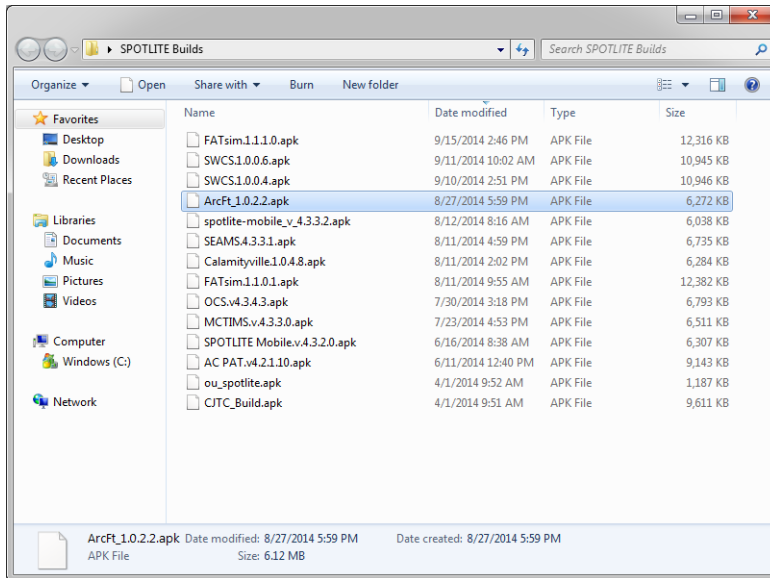


5. Open the “Download” folder on the Android Tablet

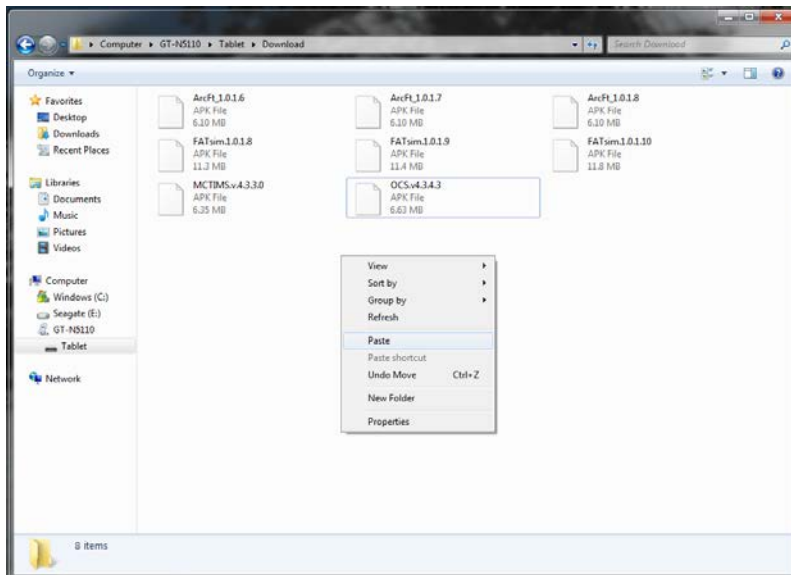


Step 2. Copy Installation File

1. Connect your Android Mobile device to your PC.
2. Locate the ARC-FT installer file on your PC. Note the title will likely be “ArcFt” followed by a version number. What is important is that the file type is “.apk,” which is a mobile app installer.
3. Right click the file and select “Copy”



4. In the white space of the Download folder on the Tablet window right click and select “Paste”

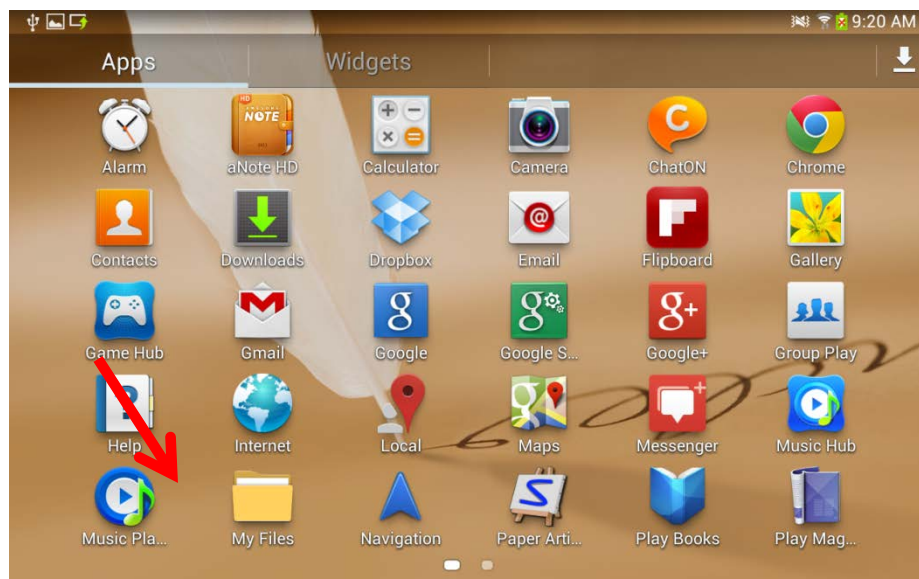


Step 3. Access the Android Device's File Manager

1. Disconnect the tablet from the PC by removing the USB cable from the Tablet
2. Open the Android device's Application Menu to access the File Manager. If the device does not come with a pre-installed File Manager, many options exist in the Google Play Store (*Astro File Manager* is recommended).



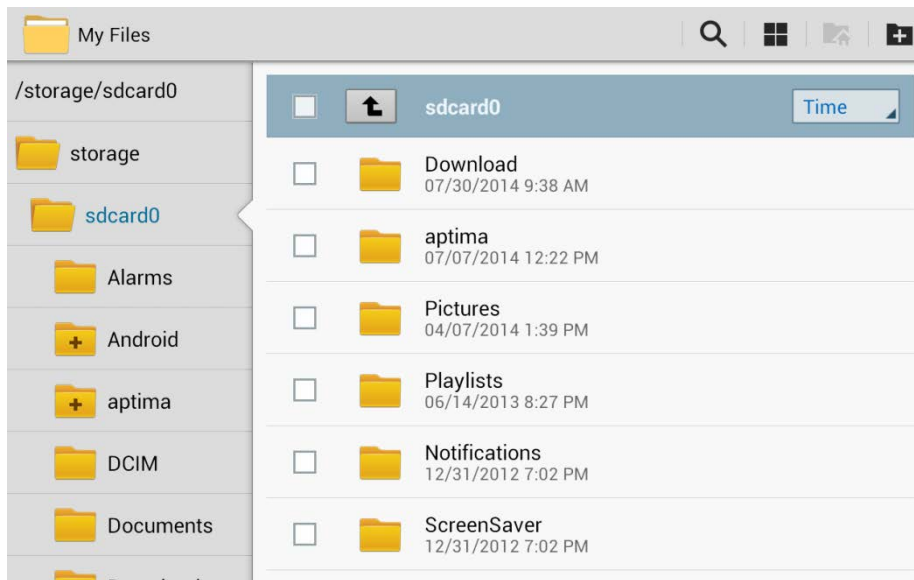
3. Select the "My Files" app



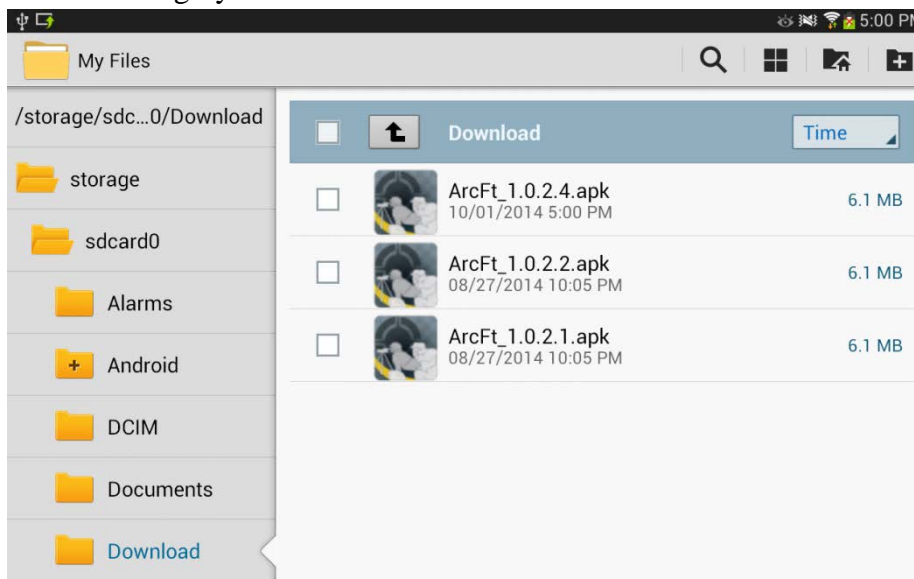
Step 4. Locate the ARC-FT Installation File

The ARC-FT installation file can be found in the same folder you pasted the .apk into (usually “Download”). If it was copied to a different directory, that folder can also be accessed through the File Manager.

1. Navigate to the “Download” folder



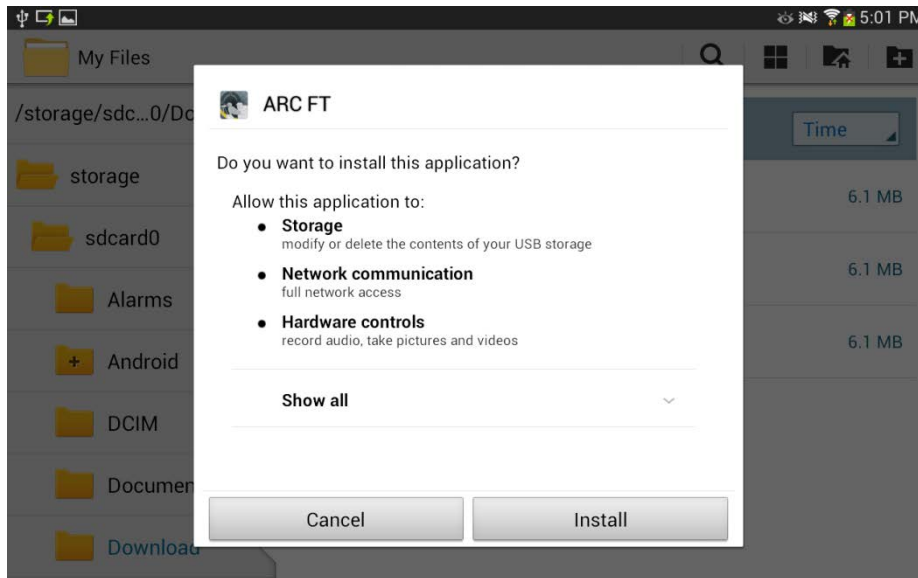
2. The open Download folder should show the ARC-FT .apk. Select it and follow the instructions on the pop-up windows. Note: you may get a warning and a request to authorize installation of a file from an unknown source. OK this process. ARC-FT is tested thoroughly and contains no nefarious code.



Step 5. Install ARC-FT

Open the ARC-FT installation file in the File Manager and press *Install*. If you already have the application on your tablet, you will get the following warning: *Press OK to update your app to the new version*. If you do not already have an older version installed, this message will not display.

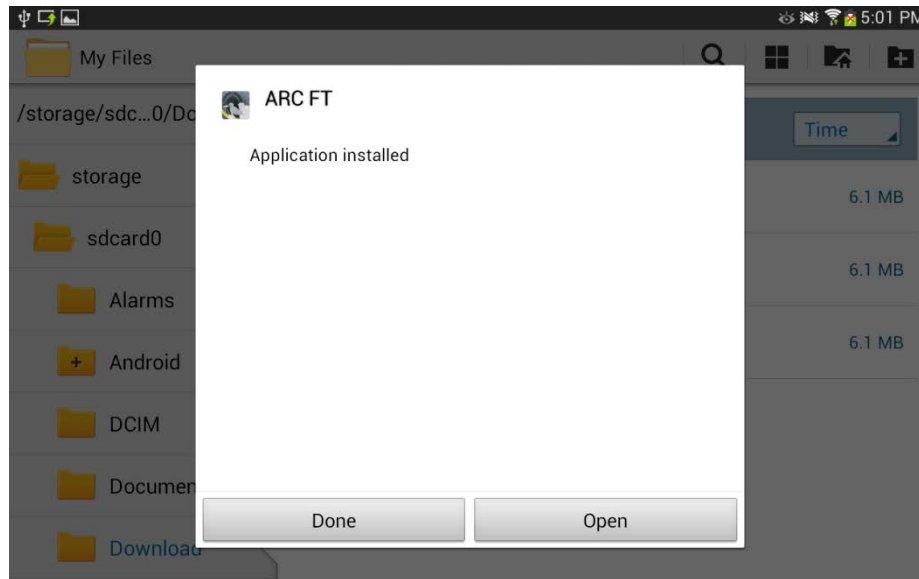
1. Click “Install” from the pop-up window.



The application will install

Step 6. Complete Installation

A confirmation message will appear when installation is complete. Select Done to exit setup and touch the Home Screen icon to exit the file manager. Selecting “Open” will open the application.



Using ARC-FT

There are five primary activities in ARC-FT:

1. Database Integration and Configuration
2. Observations
3. Assessments
4. Trending Displays
5. Assessment Upload


This guide will discuss the procedures required to accomplish all of these activities in ARC-FT.

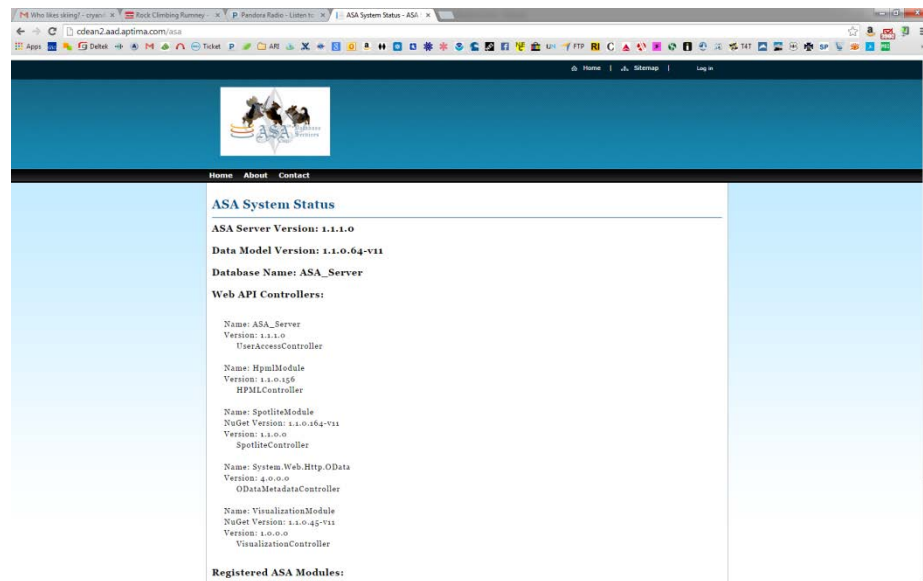
Activity 1. Database Integration and Configuration


1. The first step in using ARC-FT is to connect the mobile application to the ARC Integrated Database. Note that this should be done for you prior to distribution of the devices. However, it may be that not all tablets were networked or that an has reset these settings. To connect ARC-FT to the database, the Android device must be connected to the ARC local area network (LAN). The wireless router supports a limited range of a few hundred feet. Thus, the integration and configuration will likely have to occur at Patton

Hall (or wherever the database is kept) prior to taking ARC-FT into the field. To connect the device to the LAN, pull up the Android Device's "Settings" application.

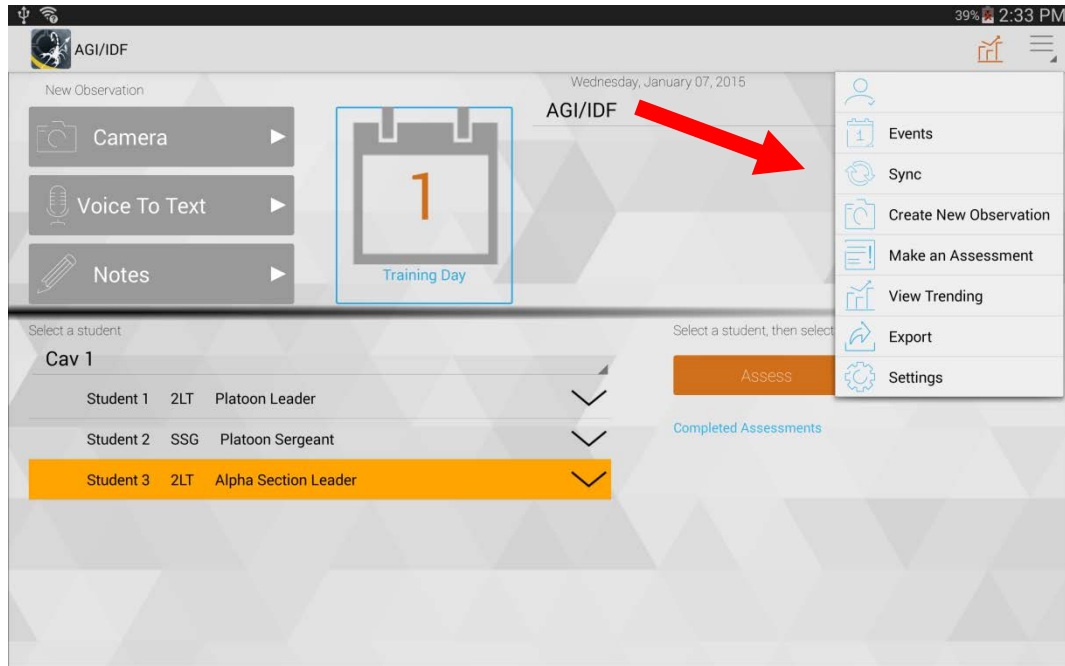
- From the Settings application, select the "Connections" tab and turn on the "Wi-Fi" switch. Search the wireless connections for "TP-LINK_Pocket_3020_947F18". Tap ARC-FT to connect. You will be prompted to provide a Network Key. The key is **13372903**.

- Once you are connected, you must test the connection. Open the internet browser  and type "http://192.168.0.100/ari". If the tablet is connected, then the following website should appear.



To start ARC-FT, tap the ARC-FT icon  in the apps menu.

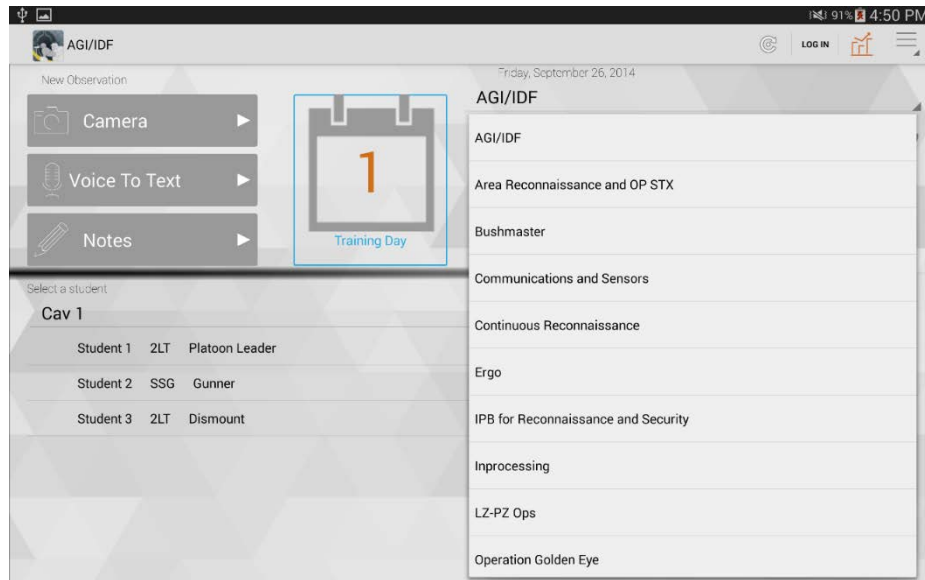
- The final step in connecting to the database is to select the Menu in the top right corner of the app interface. From this menu, select "Settings."
- From the Settings there is a space to type in the "ASA Server URL." The URL should read "http://192.168.0.100/ari." If it does not, then replace the text with that. Tap Sync Configurations with ASA.
- Tap "Pick Configuration." A list of configurations should appear. These should be formatted like the ARC course structure, year and class number (e.g., 14-008). Select the appropriate configuration (likely the latest). This will load the application with the student roster.
- From the top menu, again, select the instructor option (should be the first item on the menu). A profile menu will appear. Fill out title, first and last name. Your name will now appear in the menu next to the instructor icon.




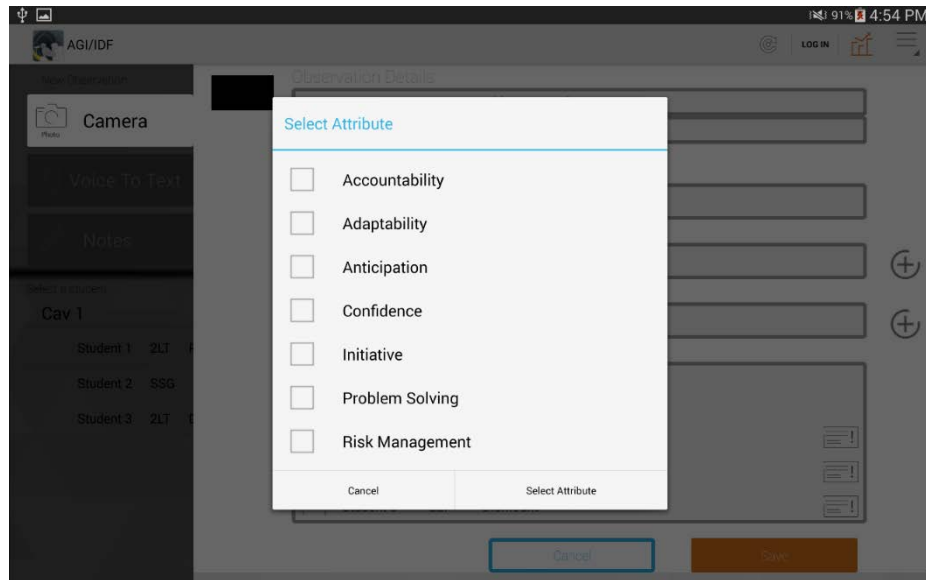
Activity 2. Making Observations


The Observations function allows instructors to perform opportunistic data collection. This set of tools is designed to provide multi-media options for capturing notes about student behavior quickly and at the time of occurrence. Instructors using ARC-FT should be able to pull out the tablet and either photo/video student behavior, or dictate/type descriptions of what was observed and associate the photo, video, or text with the student and the Expected Outcomes and Leader Attributes that are key indicators of student progression in the course.

1. At the start of the training day, the ARC-FT tool will need to be set to the proper day and event. Tap the “Training Day” calendar icon in the top middle of the interface to set the training day.
2. Select the training event near the top right of the interface. The dropdown menu icon will open up the list of events.



3. The training day and event should be addressed every day to ensure the student assessments are captured for the correct events.
4. To capture an observation, select any of the “New Observation” buttons that appear in the top left corner of the interface. There are three options: Camera, Voice to Text, Notes.
 - a. Camera allows the user to capture photo or video of the student(s)
 - b. Voice to text allows the instructor to dictate his/her observations and the device will transcribe the speech.
 - c. Notes allow the instructor to type a narrative description of the student(s) behavior.
5. After capturing a photo, or video, the tool will provide a supplemental data screen. Voice to Text and Notes will begin with this screen. This screen will prompt the user to provide additional information about the observation. This includes a type-written summary description, checklists of Expect Outcomes, Leader Attributes and the students in the current class, organized by Cav.
6. To provide a summary, tap the text box under the Summary header. The summary can later be pasted into the assessment form so it is important to provide meaningful information here and to select the appropriate Attributes and Outcomes and link the observation to the appropriate student.
7. To select Attributes and Outcomes, select the  icon to the right.



8. To select one or more students, tap the check box to the left of each student's name.
9. A Green Card icon is also made available next to each student's name  to allow instructors to document the issuing of a green car if it occurred. Tapping on the green card icon will change it from gray to green. If the green card was activated in error, simply tap it again to return the icon to gray.
10. At the bottom of the interface, Cancel and Save buttons are available to complete the observation. Cancel will delete any record of the observation. This should only be used if the observation was started in error.

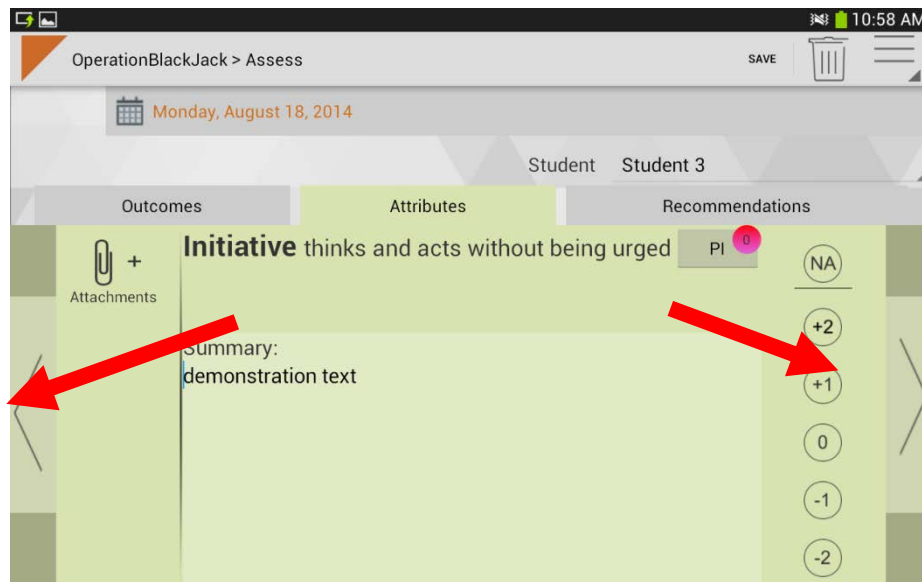
Activity 3. Completing Assessments

The Assessment function is a digital version of the assessment form completed by instructors to document student progress. The Assessment function enables users to paste summary comments from observations eliminating redundant steps. Completed assessments are also uploaded from the ARC-FT to the Integrated Database where they are stored, reviewed, and printed.

1. To begin an assessment, select a student from the list of students in the bottom left half of the ARC-FT interface. The students are organized by Cav. To navigate the list of Cavs, expand the dropdown menu by tapping on the gray triangle in the corner. Select the appropriate Cav and then tap the student name.
 - a. An optional Leadership Role selection for students is included on this list. If a student is performing in a leadership role (e.g., Platoon Sergeant, Alpha Team Leader) that role can be specified by tapping on the down facing arrow next to the Student's name. The selected role will then be listed on the assessment form (in print form). If no role is selected, then that entry will be left blank when the form is printed.
2. Once a student is selected, tap the "Assess" button to open the Assessment screen. The Assessment screen will be characterized by the Event in the top left corner, the date

below that, and the student's name on the right side. It features three tabs: Outcomes, Attributes and Recommendations.

- Each Outcome and Attribute can be rated from -2 - +2, or NA if no rating is made. A summary blank is provided to justify the score. The attachments icon on the left side of the interface allows the user to attach any summary descriptions provided in the observations.
- To select different outcomes or attributes, tap the left and right toggle switches. These will cycle through the list of outcomes or attributes.



- To attach an observation, select the Attachments icon. A pop-up will appear listing the relevant observations. Only observations that are linked to the currently selected Outcome or Attribute will appear. Observations are characterized by their type with an icon displayed, by their name, and usually the date and event. Select one or more observations by tapping on the checkbox to the left of the attachment icon. Attaching an observation will paste any summary text into the summary blank on the assessment page. Note that this must be done for each Attribute and Outcome separately.
- Leader Attributes have an additional data input option. The PI button allows instructors to review a set of performance indicators that characterize observable behaviors demonstrated by students. These can be selected by instructors to add additional information to the assessment. To select a performance indicator, check the box to the left of the phrase.

Activity 4. Using Trending Displays

The Trending Display features a line graph for each student with nodes representing the ratings captured for Attributes and Outcomes. It allows instructors to see student progress in a high level graphical form that is easily interpreted, yet offers drill-down options with detailed information.

- To access the Trending Display, tap the trending button in the top right corner of the interface to access the Trending Display.

2. The Trending Display will open showing aggregate data for the selected student. NOTE: The tool will default to the first student in the roster list and Expected Outcomes for that student. The graph will feature an individual, color-coded line for each Expected Outcome. Each line will have one or more circular nodes that align to the performance scale (e.g., +2 - -2) on the vertical axis (Y) and the training day (e.g., 1-27) it was collected on the horizontal axis (X).
3. If the graph is too cluttered, individual Outcomes can be hidden from view. The Outcomes are listed with their representative colors in the window to the left of the graph. Tapping on any of these Outcomes will hide it from view. The Outcome name will be faded in the window. To show the line graph for a hidden Outcome, simply tap the name of the outcome again.
4. Each Node on the graph represents an assessment made for that Outcome. Tap the node to see additional information about the assessment, including the summary narrative, date of collection, and the training event. A pop-up will appear displaying these data. The pop-up will be proximal to the node it represents and will feature a like-colored border. These features help the user ensure that the information displayed represent the desired node, which is critical when many ratings have been made.
5. All of the features described in 3-5 are available for Leader Attributes. To view results for Attributes, simply tap the Attributes tab above the graph. Individual Attributes will be represented by color coded lines and nodes that can be shown or hidden and opened to view supporting information.
6. There is a student identifier and dropdown list in the trending display. This allows instructors to see which student is selected, verify that the correct student's data are displayed, and to change students. To select a different student, select the dropdown arrow to the right of the student's name.

Activity 5. Assessment Upload

ARC-FT enables trainers to push data collected in the field to the database for storage and examination. Uploading data to the database functions much like integration and configuration. The tablet must be connected to the local area network and the application should be connected to the database through that wireless connection. *It is recommended that instructors upload data frequently to minimize loss due to damage of tablets and to keep the database current.*

1. Connect the mobile application to the ARC Integrated Database. Note that this should be done for you prior to distribution of the devices. However, it may be that not all tablets were networked or that an update has reset these settings. To connect ARC-FT to the database, the Android device must be connected to the ARC local area network (LAN). The wireless router supports a limited range of a few hundred feet. Thus, the integration and configuration will likely have to occur at Patton Hall (or wherever the database is kept) prior to taking ARC-FT into the field. To connect the device to the LAN, pull up the Android Device's Settings application.

2. From the Settings application, select the Connections tab and turn on the Wi-Fi switch. Search the wireless connections for “TP-LINK_Pocket_3020_947F18”. Tap ARC-FT to connect. If the tablet has been previously connected to the network, the network key should be known by the device.
3. Once you are connected, you must test the connection. Open the internet browser and type “http://192.168.0.100/ari”. If the tablet is connected, then the following website should appear.
Once a connection is confirmed, return to the ARC-FT app.
4. Select Settings from the top menu.
5. A pop-up will appear. Press the “Sync Configurations with ASA” button.
6. A pop-up will appear. Confirm that the “ASA Server URL” is correct at “http://192.168.0.100/ari”
7. If the URL is correct, Press “Sync Configurations with ASA.
8. Press Done.
9. Select Export option from the top menu. This will now upload the data collected for ARC students.

Integrated Database

Installation and Setup

This section details the system requirements and setup of the Integrated Database. Note that installation instructions are provided in a separate set of documents. These instructions are based on the assumption that the user has administrative privileges on the device on which the software will be installed.

Operating System Requirements

The Integrated Database is compatible with Windows 7 or higher, but requires 64-bit operating system.

Software and Hardware Requirements

- Desktop or Laptop
- 2.9 GB or higher processor
- 8 GB of RAM
- Windows 7
- 64-bit Operating System
- 150Mbps or higher Wireless Router
- Google Chrome (Recommended)

Installation

The Integrated Database should come installed and ready to use. It is not recommended that this be removed or modified as the installation process is a complicated process and is not recommended without the assistance of a software engineer.

Using the Integrated Database

There are four primary activities in the Integrated Database

1. Startup and Login
2. Trend Analysis
3. Documents
4. Administration

This guide will discuss the procedures required to accomplish all of these activities in the Integrated Database.

Activity 1. Startup and Login

The integrated database can be accessed through a web browser. The interface has been optimized for Google Chrome so it is recommended that the user use Chrome unless the browser software is not available. Microsoft Internet Explorer version 9 or higher will also work.

1. Connect the wireless router to the PC or Laptop. Insert one end of the CAT5 (Ethernet) cable into the computer and the other end into the router. Make sure to power the router either by the wall plug or with the USB cable. Also, ensure that the router is switched to WISP.
2. Open Google Chrome and type the following URL into the search menu:
“http://192.168.0.100/ari”
3. The browser should navigate to the Database home screen. This screen will be primarily white, with no content except for the system name in the top left corner and a login button on the right corner. Because there is sensitive personnel information contained and displayed in this system, access is denied without a proper login.
4. To login, tap the Login button. A pop-up will provide inputs for username and password. The default username and password for the system are:

Username: administrator
Password: tester
5. Once logged in, menu items will appear in the top menu. There are three: Trend Analysis, Documents, and Administration.

Activity 2. Trend Analysis

The Trend Analysis tools offered in the Integrated Database go beyond what is offered in the Mobile Application. These tools allow instructors and course administrators to view multiple

students at the same time, and compare group averages at the CAV, Class, or even Year level. With the Integrated Database, all of the collected and uploaded data are accessible.

1. Select the Trend Analysis icon in the top menu.
2. A set of filters will appear on the left hand side of the interface. The top filters are: Students, Instructors, and Events. Each of these top filters will organize the data accordingly and open up additional filters to allow users to dive deeper.

NOTE: Currently, the only high level filter available is the student view. The instructor and Events filters are still in development.

3. Select the student filter and a second set of filters appears. These filters enable users to look at student data by year, class, Cav or individual. The values in each of these filters are multi-select. Therefore a user can select two or more years, courses, Cavs or students for comparison. Note however, that if two or more items are selected, the next level down will be disabled. In other words, if two Cavs are selected, then the data displayed will be an average of student scores from those two Cavs in two sets of columns (one column per Outcome, or Attribute).
4. In the example below, three students from year 2014, class 14-100a (a fictional course), Cav 1 were selected. Two of these students have data. The third does not. Average ratings for three different Expected Outcomes appear based on the data in the database for each of the two students.
5. Graph displays will default to Expected Outcomes. To view Attribute data, select the “Attributes” tab above the graphs.
6. Different filtering combinations will yield different data displays. As more data are entered, more interesting and useful trending data will be made available.

Activity 3. Documents

The Integrated Database supports current best documentation practices within the ARC. The software produces Assessment forms that should mirror those currently used by cadre for students. These forms can then be printed and stored as per current practice.

1. Select the Documents option from the top menu.
2. A set of menu items should appear on the left hand side of the interface. The View Assessments option accesses the completed and uploaded student assessment forms.
3. Student forms are accessed using the same filtering system offered in the Trend Analysis function. Cadre can select one or more years, classes, Cavs or students to view and print forms. The filters work in the same way so if multiple students from a Cav are selected, then forms for each student will appear.
4. Once selections have been made in the filters, the completed Assessment forms will appear in the middle of the interface. The forms are not editable in this view. However, if data are missing (such as duty position or rating instructor) once printed, they can be modified with pen or pencil.
5. To print the form, select the Print Assessment, or Print Assessment Group buttons above the form. The Print Assessment button will print only one assessment at a time. The Print

Assessment Group button will print all forms from within the filtering criteria (e.g., all forms for selected student, or Cav).

6. The Raw Data Manipulation is the second menu item on the left hand side. This is primarily a developer's tool. It provides a view of the data captured and some tools to modify those data, but is currently not user friendly. *It is highly recommended that this function be ignored while the tool remains in development.*

Activity 4. Administration

The Administration features provides access and data management tools for leadership and cadre. This menu item features Roster Upload and management, Instructor Profiles and User Access controls. The administration functions can enable restrictions to be made on who can see, or manipulate data in the database. *For purposes of maintaining sensitive data integrity and management of the system, it is recommended that someone be assigned administrator of the Integrated Database who is responsible for granting access to the tool.*

7. The administration button is featured on the top menu. Selecting it opens up several controls on the left hand side. These include User Administration, User Access Control, Class Roster, and Instructor Roster
8. User Administration allows an administrator to add users (generally course instructors and leadership). Select Add User and complete the form for the new user. Select the appropriate role for the user based on the rights they should have. There should only be one Administrator. Managers have read and write privileges, but cannot control other users' access. Users have much more limited controls. Most users should probably have Manager credentials.

Note: The user list provides access to all users and roles can be changed there if the need arises. The user list features all of the Administrators, Managers and Users with credentials currently in the system.

9. User Access Control is a detailed administrative function. This function allows an Administrator to specify the data a user can access, view, and/or manipulate. Select Manage User ASAOjects to see a list of users and a list of the configurations.

Note: A configuration in this case is a class (e.g., 14-008).

10. From here, a user can be selected and access, or control can be granted to the user for any specific configuration. No Access will prevent the user from accessing the data from that configuration. Admin will grant the user full access to the roster with no restrictions (should be limited to one or two users). Author will allow the user to modify the roster (in the event a student is dropped). Viewer allows the user to see the roster, but the user is not permitted to make modifications.

Note: Each of the different levels provides some degree of control. Reporter is largely a developer's function and is not recommended for use. Admin, Author and Viewer will provide the user with the appropriate controls.

11. Class Roster provides both an import function and an editing function. Though they are presented in alphabetical order, the likely interaction process will be import first, edit second. Therefore, these instructions will describe the functions in that order.

12. Import Roster allows Administrators and Managers to load a student roster from an Excel file. Select Import Roster and a pop-up window will appear. The window provides two options: Select the Add Files option or drag and drop an Excel file onto the Drop Files Here image. Add Files will open up Windows Explorer allowing the Administrator/Manager to navigate to the location of the roster file. If the file is already selected, it can be dragged and dropped onto the Drop Files Here Button quickly. After either process, press Upload and the roster should upload into the database.

Selecting Edit Class Roster presents a Class selection dropdown and a simple filter by Cav for the class. With a Cav selected, all of the students in that Cav will appear. With a roster in the database, Administrators and/or Managers can edit the roster as needed. Editing functions are currently limited to adding or removing a student. Currently, the tool does not allow students to be moved from one Cav to another. However, this feature will be added in the future. *Note: there is also an Add Class button. This button will create a new class where students can be added one at a time. This feature is still in development and does not yet support the organization of students into Cavs.*

13. The Instructor Roster menu item allows Administrators and Managers to create basic profiles for ARC instructors. The Edit Instructor Roster feature functions in the same way as the Edit Student Roster. Instructors can be added or removed from the database. Creating these instructor profiles is essential to proper data management as these profiles will be sent to the ARC-FT devices, allowing each instructor to select his name from the list to log in. *Note: Instructors are treated differently than Administrators, Managers, and Users in the Database. This feature is designed to enable the viewing of trending data by instructor in the future.*

APPENDIX F

Usability Questionnaires for the Tool

ARC-FT Usability Scale

Date: _____

Mission/Event Type: _____

Directions: Place a check mark in the box that best represents your rating of your experience using the ARC Field Tool (ARC-FT).

	Strongly Disagree					Strongly Agree
1. I think that I would like to use the ARC-FT frequently.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
2. I found the ARC-FT to be unnecessarily complex.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
3. I thought the ARC-FT was easy to use.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
4. I think that I would need the support of a technical person to be able to use the ARC-FT.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
5. I found the various functions in the ARC-FT to be well integrated.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
6. I thought there was too much inconsistency in the ARC-FT.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
7. I would imagine that most people would learn to use the ARC-FT very quickly.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
8. I found the ARC-FT to be very cumbersome to use.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
9. I felt confident using the ARC-FT.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4
10. I needed to learn a lot of things before I could get going with this ARC-FT.	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
	1		2		3	4

Integrated Database Usability Scale

Date: _____

Mission/Event Type: _____

Directions: Place a check mark in the box that best represents your rating of your experience using the Integrated Database.

	Strongly Disagree			Strongly Agree
1. I think that I would like to use the Integrated Database frequently.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
2. I found the Integrated Database to be unnecessarily complex.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
3. I thought the Integrated Database was easy to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
4. I think that I would need the support of a technical person to be able to use the Integrated Database.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
5. I found the various functions in the Integrated Database to be well integrated.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
6. I thought there was too much inconsistency in this Integrated Database.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
7. I would imagine that most people would learn to use this Integrated Database very quickly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
8. I found the Integrated Database to be very cumbersome to use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
9. I felt confident using the Integrated Database.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4
10. I needed to learn a lot of things before I could get going with this Integrated Database.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1	2	3	4

APPENDIX G

Usability Statements Questionnaires

Questions about the ARC-FT			
	Statement	Disagree	Agree
1	Within the ARC-FT, I knew exactly where to go to capture an observation.		
2	It was easy to tell if I had completed an observation.		
3	I knew exactly where to go within the tool to capture an assessment.		
4	It was easy to tell if I had completed an assessment.		
5	At times, I had trouble remembering where I was in the system.		
6	I knew when all of the outcomes and attributes had been assessed.		
7	Sometimes it was hard to remember how to use the ARC-FT.		
8	The ARC-FT used the same language we use during exercises.		
9	The terms were used consistently throughout the ARC-FT tool.		
10	I understood how the observations and assessments I made would be applied to collect information about student performance.		
11	The user interface supported my work style and allowed me to capture data in the way that I think is most effective.		
12	The ARC-FT was easy to navigate to different outcomes and attributes.		
13	Sometimes, I wanted to go back to an outcome, or attribute to change my entry, but it was difficult to find it.		
14	When I made a mistake, it was easy to undo my error.		
15	I found that I made many errors when I...		
	Made camera, voice to text, or keyboard observations		
	Used the roster to select a student		
	Completed an assessment for a student		
	Selected behavioral anchors for attributes		
	Used the Trending interface		
	Uploaded data to the database		
16	I hardly ever made an error when using the ARC-FT tool.		
17	When I made an error, I always knew it.		
18	It didn't take me long to learn how to...		
	Make camera, voice to text, or keyboard observations		
	Used the roster to select a student		
	Completed an assessment for a student		
	Selected behavioral anchors for attributes		
	Used the Trending interface		
	Uploaded data to the database		
22	I was able to enter observations and assessments quickly, even when I was using the ARC-FT for the first time.		
23	The interface was easy to read.		
24	The interface had too much information on it.		
25	The information shown on the display was helpful.		
26	I thought the interface was organized well.		

Questions about the Integrated Database			
	Statement	Disagree	Agree
1	Within the Integrated Database, I knew exactly where to go to find student assessments.		
2	It was easy to find data for a Cav or a student.		
3	I knew exactly where to go within the tool to find completed assessments.		
4	It was easy to tell if I had selected the right students or Cavs for trend analysis.		
5	At times, I had trouble remembering where I was in the system.		
6	I knew when all of the data were displayed.		
7	Sometimes it was hard to remember how to use the database		
8	The Integrated Database used the same language we use during exercises.		
9	The terms were used consistently throughout the tool.		
10	I understood how the assessments I made were displayed in the Integrated Database		
11	The user interface supported my work style and allowed me to capture data in the way that I think is most effective.		
12	The Database was easy to navigate to different Cavs and students.		
13	When I made a mistake, it was easy to undo my error.		
14	I found that I made many errors when I...		
	Selected a Cav or student from the filters		
	Selected Assessment forms for print		
15	I hardly ever made an error when using the Integrated Database.		
16	When I made an error, I always knew it.		
17	It didn't take me long to learn how to...		
	Select a Cav or student from the filters		
	Select Assessment forms for print		
18	I was able to find the information I was looking for quickly.		
19	The interface was easy to read.		
20	The interface had too much information on it.		
21	The information shown on the display was helpful.		
22	I thought the interface was organized well.		

APPENDIX H

Interview Protocol

	Question Target	Question
1	Perceived Usability/Utility	What were your impressions of the user interface and the workflow of the ARC-Field Tool?
2	Perceived Usability/Utility	What aspects/components of the ARC-Field Tool helped you perform your job more effectively?
3	Perceived Usability/Utility	What aspects/components of the ARC-Field Tool made your job more difficult?
4	Feature Requests	What observation, assessment, and debriefing tasks do you need help doing? Could some change to the ARC-Field Tool or Integrated Database help you do them?
5	Use	Would you use the ARC Performance Assessment Toolset? Do the ARC-FT and Integrated Database meet the needs of the ARC?
6	Feature Requests	How can we improve the ARC-Field Tool? How can we improve the Integrated Database?

APPENDIX I

Item-Level Descriptive Statistics for Tool Evaluation

Responses to Standard Usability Questions for ARC-FT Supported Evaluation

Statement	N	Mean	Median	Mode
1. I think that I would like to use these display concepts frequently.	7	3.71	4	4
2. I found the system to be unnecessarily complex.*	7	1.29	1	1
3. I thought the system was easy to use.	7	3.71	4	4
4. I think that I would need the support of a technical person to be able to use this system.*	7	1.29	1	1
5. I found the various functions in this system to be well integrated.	7	3.57	4	4
6. I thought there was too much inconsistency in this system.*	7	1.57	1	1
7. I would imagine that most people would learn to use this system very quickly.	7	3.71	4	4
8. I found the system to be very cumbersome to use.*	6	1.33	1	1
9. I felt confident using the system.	7	3.86	4	4
10. I needed to learn a lot of things before I could get going with this system.*	7	1.57	1	1

* Reverse coded items

Responses to Standard Usability Questions for ARC-FT Unsupported Evaluation

Statement	N	Mean	Median	Mode
1. I think that I would like to use this ARC-FT frequently.	5	3.40	3	3
2. I found the ARC-FT to be unnecessarily complex.*	5	2.00	2	2
3. I thought the ARC-FT was easy to use.	5	3.20	3	4
4. I think that I would need the support of a technical person to be able to use this ARC-FT.*	5	1.60	1	1
5. I found the various functions in this ARC-FT to be well integrated.	5	3.40	3	3
6. I thought there was too much inconsistency in this ARC-FT.*	5	1.60	2	2
7. I would imagine that most people would learn to use this ARC-FT very quickly.	5	3.60	4	4
8. I found the ARC-FT to be very cumbersome	5	1.80	2	2

to use.*

9.	I felt confident using the ARC-FT.	5	3.60	4	4
10.	I needed to learn a lot of things before I could get going with this ARC-FT.*	5	1.60	2	2

* Reverse coded items

Responses to Standard Usability Questions for ARC-DB Unsupported Evaluation

Statement	N	Mean	Median	Mode ⁺
1. I think that I would like to use this Integrated Database frequently.	3	3.00	3	-
2. I found the Integrated Database to be unnecessarily complex.*	3	2.00	2	-
3. I thought the Integrated Database was easy to use.	3	3.00	3	-
4. I think that I would need the support of a technical person to be able to use this Integrated Database.*	3	2.00	2	-
5. I found the various functions in this Integrated Database to be well integrated.	2	3.00	3	-
6. I thought there was too much inconsistency in this Integrated Database.*	2	2.00	2	-
7. I would imagine that most people would learn to use this Integrated Database very quickly.	3	3.00	3	-
8. I found the Integrated Database to be very cumbersome to use.*	3	2.00	2	-
9. I felt confident using the Integrated Database.	3	2.67	3	-
10. I needed to learn a lot of things before I could get going with this Integrated Database.*	3	2.33	2	-

⁺ No mode was calculated due to small n.

* Reverse coded items

Responses to Usability Statements for ARC-FT Supported Field Evaluation

	Statement	n	% agree
1	I knew exactly where to go to capture an observation.	7	100%
2	It was easy to tell if I had completed an observation.	7	57%
3	I knew exactly where to go to capture an assessment.	7	100%
4	It was easy to tell if I had completed an assessment.	7	71%

5	At times, I had trouble remembering where I was in the system.*	7	29%
6	I knew when all of the outcomes and attributes had been assessed.	7	86%
7	Sometimes, it was hard to remember how to use the tool.*	7	43%
8	The ARC-FT tool used the same language we use during exercises.	5	100%
9	The terms were used consistently throughout the ARC-FT tool.	7	100%
10	I understood how the observations and assessments would be applied to collect information about student performance.	7	86%
11	The user interface supported my work style and allowed me to capture data in the way that I think is most effective.	7	100%
12	It was easy to navigate to different outcomes and attributes.	7	100%
13	Sometimes, I wanted to go back to an outcome, or attribute to change my entry, but it was difficult to find it.*	7	29%
14	When I made a mistake, it was easy to undo my error.	7	57%
15	I found that I made many errors when I...*	-	-
	Made camera, voice to text, or keyboard observations	6	50%
	Used the roster to select a student	6	33%
	Completed an assessment for a student	6	50%
	Selected behavioral anchors for attributes	6	17%
	Used the Trending interface	6	0%
	Uploaded data to the database	4	25%
16	I hardly ever made an error when using the ARC-FT tool.	7	43%
17	When I made an error, I always knew it.	7	29%
18	It didn't take me long to learn how to	-	-
	Made camera, voice to text, or keyboard observations	7	100%
	Used the roster to select a student	7	100%
	Completed an assessment for a student	7	100%
	Selected behavioral anchors for attributes	7	71%
	Used the Trending interface	7	57%
	Uploaded data to the database	5	60%
19	I was able to enter observations and assessments quickly, even when I was using the ARC-FT tool for the first time.	7	86%
20	The interface was easy to read.	7	100%
21	The interface had too much information on it.*	7	14%

22	The information shown on the display was helpful.	7	100%
23	I thought the interface was organized well.	7	100%

* Reverse coded items

Responses to Usability Statements for ARC-FT Unsupported Evaluation

	Statement	n	% agree
1	Within the ARC-FT, I knew exactly where to go to capture an observation.	5	60%
2	It was easy to tell if I had completed an observation.	4	75%
3	I knew exactly where to go within the tool to capture an assessment.	4	100%
4	It was easy to tell if I had completed an assessment.	4	75%
5	At times, I had trouble remembering where I was in the system.*	4	50%
6	I knew when all of the outcomes and attributes had been assessed.	4	100%
7	Sometimes it was hard to remember how to use the ARC-FT.*	4	25%
8	The ARC-FT used the same language we use during exercises.	4	100%
9	The terms were used consistently throughout the ARC-FT tool.	4	100%
10	I understood how the observations and assessments I made would be applied to collect information about student performance.	4	100%
11	The user interface supported my work style and allowed me to capture data in the way that I think is most effective.	4	100%
12	The ARC-FT was easy to navigate to different outcomes and attributes.	4	100%
13	Sometimes, I wanted to go back to an outcome, or attribute to change my entry, but it was difficult to find it.*	4	0%
14	When I made a mistake, it was easy to undo my error.	4	75%
15	I found that I made many errors when I...*	-	-
	Made camera, voice to text, or keyboard observations	4	50%
	Used the roster to select a student	4	0%
	Completed an assessment for a student	4	25%
	Selected behavioral anchors for attributes	4	0%
	Used the Trending interface	4	25%
	Uploaded data to the database	3	33%
16	I hardly ever made an error when using the ARC-FT tool.	4	50%
17	When I made an error, I always knew it.	4	100%
18	It didn't take me long to learn how to	-	-
	Make camera, voice to text, or keyboard observations	4	50%
	Used the roster to select a student	4	100%
	Completed an assessment for a student	4	100%
	Selected behavioral anchors for attributes	4	100%
	Used the Trending interface	3	100%
	Uploaded data to the database	3	67%

19	I was able to enter observations and assessments quickly, even when I was using the ARC-FT for the first time.	4	75%
20	The interface was easy to read.	4	100%
21	The interface had too much information on it.*	3	67%
22	The information shown on the display was helpful.	4	100%
23	I thought the interface was organized well.	4	75%

* Reverse coded items

Quantitative Results of Responses to Usability Statements for ARC Database Unsupported Evaluation

Statement		n	% agree
1	Within the Integrated Database , I knew exactly where to go to find student assessments	3	33%
2	It was easy to data for a Cav or a student.	3	33%
3	I knew exactly where to go within the tool to find completed assessments.	3	67%
4	It was easy to tell if I had selected the right students or Cavs for trend analysis.	2	100%
5	At times, I had trouble remembering where I was in the system.*	2	0%
6	I knew when all of the data were displaying.*	2	50%
7	Sometimes it was hard to remember how to use the database.*	2	0%
8	The Integrated Database used the same language we use during exercises.	2	100%
9	The terms were used consistently throughout the tool.	2	100%
10	I understood how the assessments I made were displayed in the Integrated Database	2	100%
11	The user interface supported my work style and allowed me to capture data in the way that I think is most effective.	2	100%
12	The Database was easy to navigate to different Cavs and students.	2	100%
13	When I made a mistake, it was easy to undo my error.	2	50%
14	I found that I made many errors when I...*		
	Selected a Cav or student from the filters	2	0%
	Selected Assessment forms for print	2	0%
15	I hardly ever made an error when using the Integrated Database.	2	50%
16	When I made an error, I always knew it.	2	100%
17	It didn't take me long to learn how to...		
	Selected a Cav or student from the filters	2	100%
	Selected Assessment forms for print	2	50%
18	I was able to find the information I was looking for quickly.	2	50%
19	The interface was easy to read.	2	100%
20	The interface had too much information on it.*	2	50%

21	The information shown on the display was helpful.	2	100%
22	I thought the interface was organized well.	2	50%

* Reverse coded items